This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

BOSTON MEDICAL LIBRARY
IN THE
FRANCIS A. COUNTWAY
LIBRARY OF MEDICINE

TRANSACTIONS

OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.

TRANSACTIONS

OF THE

Royal Academy of Medicine

IN IRELAND.

VOL. XV.

EDITED BY

JOHN B. STORY, M.B., F.R.C.S.,

GENERAL SECRETARY;

SURGEON TO ST. MARK'S OPHTHALMIC HOSPITAL, DUBLIN.

DUBLIN:

FANNIN AND CO., LTD., GRAFTON-STREET.

LONDON: BAILLIÈRE, TINDALL, & COX.

EDINBURGH: JAMES THIN.

BRISTOL: JOHN WRIGHT & CO.

1897.

DUBLIN: PRINTED BY JOHN FALCONER, 53 UPPER SACKVILLE STREET.

CONTENTS.

	Page
List of Officers,	ix
List of Fellows,	xiii
List of Members,	xxv
List of Student Associates,	xxvi
Rules,	xxvii
Annual Report,	xxxv
Treasurer's Report,	xl

Address upon the development of the brain, PROFESSOR WILHELM HIS, 1

SECTION OF MEDICINE.

Guaiacol in pyrexia, - - - DR. H. C. DRURY, - 20

Four cases of pityriasis rubra, - - DR. J. WALLACE BEATTY, 33

Concurrent scarlatina and enteric fever, - DR. E. MACD. COSGRAVE, 43

A case of enteric fever, with jaundice and hæmaturia; death on sixth day; no intestinal lesions, but enlarged mesenteric glands and spleen; typhoid bacilli found in the spleen, - - - - DR. J. WALLACE BEATTY, 54

A clinical note on desquamation in enteric fever, - - - - - DR. NINIAN FALKINER, - 59

Widal's method of typhoid diagnosis, - DR. E. J. MCWEENEY, - 62

A case of diabetes insipidus, - - DR. BURGESS, - - 67

The significance of dilatation or gastrectasis in functional and organic diseases of the stomach, - - - - - DR. M. A. BOYD, - - 76

Two cases of relapse in scarlatina, - - DR. E. MACD. COSGRAVE, 92

Clinical pictures of children's diseases, - DR. LANGFORD SYMES, - 97

Angina pectoris, - - - - DR. J. KNOTT, - - 144

SECTION OF SURGERY.

Some surprises and mistakes, - - SIR WILLIAM THOMSON, - 183

Successful cases of tapping the pericardium, MR. A. MELDON, - - 194

On acute intestinal obstruction, - - MR. M'ARDLE, - - 206

		Page
Sixty-one cases of partial and complete excision of the tongue,	Mr. W. I. Wheeler,	233
Some cases of nephrectomy and nephrolithotomy, with remarks,	Mr. T. Myles,	259
Strangulated femoral hernia with gangrenous intestine,	Mr. F. T. Heuston,	286
Remarks on intestinal anastomosis by means of a new pattern of decalcified bone ring,	Dr. C. B. Ball,	291
Case of pyloroplasty for non-malignant stricture of pylorus; recovery,	Mr. John Lentaigne,	302
Apparatus for air distension of bladder in suprapubic cystotomy, &c.	Mr. John Lentaigne,	306
Fracture of the metacarpal bone of the thumb,	Dr. E. H. Bennett,	309

SECTION OF OBSTETRICS.

A case of rigid os. Discission by Dührssen's method,	Dr. E. Winifred Dickson	312
Three cases of ectopic gestation, with exhibition of the specimens in two of the cases,	Dr. F. W. Kidd,	316
A case of ruptured tubal pregnancy treated by abdominal section,	Dr. Alfred J. Smith,	329
Pyometra with pregnancy in the second horn of a uterus bicornis,	Dr. Patrick J. Barry,	332
Observations on the anticipation of *post-partum* hæmorrhage, with remarks on the action of ergot on pregnant women,	Dr. Atthill,	333
Case of symphyseotomy,	Dr. S. M. Thompson,	351
Notes on a case of incomplete abortion,	Dr. Henry Jellett,	352
Intraligamentous fibro-myoma strangulated by protrusion through inguinal canal,	Dr. Alfred J. Smith,	357
The use of ergot in obstetrics,	Dr. T. More Madden,	359
Notes of a case of hæmorrhage into the broad ligament arising from the stump of an ovarian cyst, and complicating the puerperium,	Dr. John H. Glenn,	372
Notes on a case of double ovariotomy with eighteen months' interval between the operations,	Dr. E. Winifred Dickson	375

SECTION OF PATHOLOGY.

Dislocation of the sternal end of the clavicle backwards,	Dr. E. H. Bennett,	380
Acute septico-pyæmia,	Dr. M. A. Boyd,	386

		Page
On two cases of pseudo-membranous enteritis, with remarks on this affection, -	Dr. W. Frazer, -	391
Pathological conditions of the heart and aorta, - - - - - -	Dr. J. B. Coleman -	394
A case of locomotor ataxy, - - -	Drs. J. B. Coleman and A. C. O'Sullivan -	400
Some applications of the "X-rays" in diagnosis; illustrated by lantern slides, skiagraphs, and the fluorescent screen, -	Dr. W. S. Haughton, -	404

SECTION OF STATE MEDICINE.

The report of the Vaccination Commission, 1895, - - - - - -	Dr. Alfred E. Boyd, -	410
On the dissemination of micro-organisms and on the best method of destroying germ emanations from sewage gas, -	Dr. C. R. C. Tichborne -	427
The recent failure of hospital accommodation in Dublin, - - - - -	Sir C. A. Cameron, -	437

SECTION OF ANATOMY AND PHYSIOLOGY.

Note on the organic sulphates of the urine,	Dr. D. J. Coffey, -	446
The surgical applied anatomy of the rectum,	Dr. E. H. Taylor, -	451
Demonstrations of some early human ova, -	Dr. A. F. Dixon, -	474

The following Papers were also accepted for the Transactions, but have not been received in time for publication:—

Medicine—Chelidonium majus, Dr. J. M. Redmond. Charcot's disease of joints, Dr. Conolly Norman. Fatal case of alcoholism, Dr. J. Knott.

Pathology—Pyonephrosis, Mr. Myles. Position of tubercle baccillus, Dr. M'Weeney. Dilated stomach; Verrucose endocarditis; Addison's disease, Sir C. Nixon. Goitre, parenchymatous and cystic, Mr. A. Chance. Pathological sections and germ cultures, Dr. M'Weeney. Trichinosis, Dr. A. R. Parsons. Baccillus of plague, Dr. J. M. Redmond. X-Rays photograph, Dr. Lane Joynt.

		Page
Sixty-one cases of partial and complete excision of the tongue,	Mr. W. I. Wheeler,	233
Some cases of nephrectomy and nephrolithotomy, with remarks,	Mr. T. Myles,	259
Strangulated femoral hernia with gangrenous intestine,	Mr. F. T. Heuston,	286
Remarks on intestinal anastomosis by means of a new pattern of decalcified bone ring,	Dr. C. B. Ball,	291
Case of pyloroplasty for non-malignant stricture of pylorus; recovery,	Mr. John Lentaigne,	302
Apparatus for air distension of bladder in suprapubic cystotomy, &c.	Mr. John Lentaigne,	306
Fracture of the metacarpal bone of the thumb,	Dr. E. H. Bennett,	309

SECTION OF OBSTETRICS.

A case of rigid os. Discission by Dührssen's method,	Dr. E. Winifred Dickson	312
Three cases of ectopic gestation, with exhibition of the specimens in two of the cases,	Dr. F. W. Kidd,	316
A case of ruptured tubal pregnancy treated by abdominal section,	Dr. Alfred J. Smith,	329
Pyometra with pregnancy in the second horn of a uterus bicornis,	Dr. Patrick J. Barry,	332
Observations on the anticipation of *post-partum* hæmorrhage, with remarks on the action of ergot on pregnant women,	Dr. Atthill,	333
Case of symphyseotomy,	Dr. S. M. Thompson,	351
Notes on a case of incomplete abortion,	Dr. Henry Jellett,	352
Intraligamentous fibro-myoma strangulated by protrusion through inguinal canal,	Dr. Alfred J. Smith,	357
The use of ergot in obstetrics,	Dr. T. More Madden,	359
Notes of a case of hæmorrhage into the broad ligament arising from the stump of an ovarian cyst, and complicating the puerperium,	Dr. John H. Glenn,	372
Notes on a case of double ovariotomy with eighteen months' interval between the operations,	Dr. E. Winifred Dickson	375

SECTION OF PATHOLOGY.

Dislocation of the sternal end of the clavicle backwards,	Dr. E. H. Bennett,	380
Acute septico-pyæmia,	Dr. M. A. Boyd,	386

		Page
On two cases of pseudo-membranous enteritis, with remarks on this affection, -	Dr. W. Fraser, -	391
Pathological conditions of the heart and aorta, - - - - - -	Dr. J. B. Coleman -	394
A case of locomotor ataxy, - - -	Drs. J. B. Coleman and A. C. O'Sullivan -	400
Some applications of the "X-rays" in diagnosis; illustrated by lantern slides, skiagraphs, and the fluorescent screen, -	Dr. W. S. Haughton, -	404

SECTION OF STATE MEDICINE.

The report of the Vaccination Commission, 1895, - - - - - -	Dr. Alfred E. Boyd, -	410
On the dissemination of micro-organisms and on the best method of destroying germ emanations from sewage gas, -	Dr. C. R. C. Tichborne -	427
The recent failure of hospital accommodation in Dublin, - - - - -	Sir C. A. Cameron, -	437

SECTION OF ANATOMY AND PHYSIOLOGY.

Note on the organic sulphates of the urine,	Dr. D. J. Coffey, -	446
The surgical applied anatomy of the rectum,	Dr. E. H. Taylor, -	451
Demonstrations of some early human ova, -	Dr. A. F. Dixon, -	474

The following Papers were also accepted for the Transactions, but have not been received in time for publication :—

Medicine—Chelidonium majus, Dr. J. M. Redmond. Charcot's disease of joints, Dr. Conolly Norman. Fatal case of alcoholism, Dr. J. Knott.

Pathology—Pyonephrosis, Mr. Myles. Position of tubercle baccillus, Dr. M'Weeney. Dilated stomach; Verrucose endocarditis; Addison's disease, Sir C. Nixon. Goitre, parenchymatous and cystic, Mr. A. Chance. Pathological sections and germ cultures, Dr. M'Weeney. Trichinosis, Dr. A. R. Parsons. Baccillus of plague, Dr. J. M. Redmond. X-Rays photograph, Dr. Lane Joynt.

LIST OF ILLUSTRATIONS.

	Page
Address upon the development of the brain (PROFESSOR HIS),	1
Guaiacol in pyrexia (DR. H. C. DRURY),	20
Four cases of pityriasis rubra (DR. J. WALLACE BEATTY),	33
Concurrent scarlatina and enteric fever (DR. E. MACDOWEL COSGRAVE),	43
A clinical note on desquamation in enteric fever (DR. FALKINER),	59
Two cases of relapse in scarlatina,	92
Successful cases of tapping the pericardium (MR. A. MELDON),	194
On acute intestinal obstruction (MR. M'ARDLE),	206
Some cases of nephrectomy and nephrolithotomy (MR. T. MYLES),	259
Remarks on intestinal anastomosis by means of a new pattern of decalcified bone ring (DR. C. B. BALL),	291
Fracture of the metacarpal bone of the thumb (DR. E. H. BENNETT),	309
Three cases of ectopic gestation (DR. F. W. KIDD),	316
Dislocation of the sternal end of the clavicle backwards (DR. E. H. BENNETT),	330
Some applications of the "X-rays" in diagnosis (DR. W. S. HAUGHTON),	404
The surgical applied anatomy of the rectum (DR. E. H. TAYLOR),	451
Demonstrations of some early human ova (DR. A. FRANCIS DIXON),	474

ROYAL ACADEMY OF MEDICINE IN IRELAND.

SESSION 1896-97.

OFFICERS.

President:

JAMES LITTLE, M.D. (*Hon. Causâ*) Univ. Dubl., M.D. Edin., F.R.C.P., 14 St. Stephen's-green, North, Dublin.

General Secretary and Treasurer:

JOHN B. STORY, F.R.C.S., 6 Merrion-square, N.

Secretary for Foreign Correspondence:

JOHN W. MOORE, M.D., 40 Fitzwilliam-square.

General Council:

James Little, President.
Sir John Banks, K.C.B., Ex-President.
Samuel Gordon, Ex-President.
Sir George F. Duffey, President of Medical Section.
Sir William Thomson, President of Surgical Section.
Lombe Atthill, President of Obstetrical Section.
Conolly Norman, President of Pathological Section.
Johnson Symington, President of Section of Anatomy and Physiology.
J. M. Redmond, President of Section of State Medicine.
John B. Story, General Secretary and Treasurer.
John W. Moore, Secretary for Foreign Correspondence.
H. C. Tweedy, Secretary Medical Section.
John Lentaigne, Secretary Surgical Section.
Fred. W. Kidd, Secretary Obstetrical Section.
E. J. McWeeney, Secretary Pathological Section.
A. Birmingham, Secretary Section of Anatomy and Physiology.
Ninian Falkiner, Secretary Section of State Medicine.

W. G. Smith,
J. Craig, } Representatives from Medical Council.

E. Hamilton,
Sir William Stokes, } Representatives from Surgical Council.

R. H. Fleming,
A. Horne, } Representatives from Obstetrical Council.

A. R. Parsons,
J. A. Scott, } Representatives from Pathological Council.

Council of Medical Section:

President—SIR GEORGE F. DUFFEY, President of the Royal College of Physicians.

1. *Secretary*—H. C. TWEEDY, 7 Clare-street.

2. WALLACE BEATTY,
3. M. A. BOYD,
4. JAMES CRAIG,
5. RICHARD A. HAYES,
6. J. W. MOORE,
7. J. O'CARROLL,
8. A. R. PARSONS,
9. J. M. REDMOND,
10. WALTER G. SMITH.

Council of Surgical Section:

President—SIR WILLIAM THOMSON, President of the Royal College of Surgeons.

1. *Secretary*—JOHN LENTAIGNE, 29 Westland-row.

2. C. B. BALL,
3. E. H. BENNETT,
4. EDWARD HAMILTON,
5. F. T. HEUSTON,
6. T. MYLES,
7. SIR WILLIAM STOKES,
8. SIR THORNLEY STOKER,
9. W. I. WHEELER,
10. R. H. WOODS.

Council of Obstetrical Section:

President—LOMBE ATTHILL, Monkstown Castle, Co. Dublin.

1. *Secretary*—FRED. W. KIDD, 17 Lower Fitzwilliam-street.

2. G. COLE-BAKER,
3. R. H. FLEMING,
4. ROBERT A. FLYNN,
5. J. H. GLENN,
6. A. J. HORNE,
7. J. L. LANE,
8. T. MORE MADDEN,
9. A. J. SMITH,
10. W. J. SMYLY.

Council of Pathological Section:

President—CONOLLY NORMAN, Superintendent Richmond District Lunatic Asylum.

1. *Secretary*—EDMUND J. McWEENEY, 84 St. Stephen's-green.

2. A. H. BENSON,
3. H. BEWLEY,
4. HENRY C. DRURY,
5. J. O'CARROLL,
6. A. C. O'SULLIVAN,
7. A. R. PARSONS,
8. J. M. PURSER,
9. J. A. SCOTT,
10. H. R. SWANZY.

Council of Section of Anatomy and Physiology:

President—JOHNSON SYMINGTON, Professor of Anatomy, Queen's College, Belfast.

1. *Secretary*—A. BIRMINGHAM, Medical School, Cecilia-street.

2. JOHN BARTON,
3. D. J. COFFEY,
4. D. J. CUNNINGHAM,
5. THOMAS E. GORDON,
6. R. H. WOODS.

Council of Section of State Medicine:

President—J. M. REDMOND, 8 Clare-street.

1. *Secretary*—NINIAN FALKINER, 81 Lower Leeson-street.

2. SIR C. CAMERON,
3. THOMAS DONNELLY,
4. D. EDGAR FLINN,
5. T. W. GRIMSHAW,
6. H. C. TWEEDY.

Reference Committee:

1. E. H. BENNETT,
2. A. H. BENSON,
3. RICHARD A. HAYES,
4. ALFRED J. SMITH.

HONORARY FELLOWS.

1885*Billroth, Professor T., Vienna.
1885*Charcot, Professor, Paris.
1885 Emmet, Thomas Addis, 9 Madison Avenue, New York.
1885*Flint, Professor Austin, New York.
1885 Hutchinson, Jonathan, F.R.S., London.
1885 Jenner, Sir William, Bart., F.R.S., London.
1885*Keith, Thomas, London.
1885 Kölliker, Professor, Würzburg.
1885 Lister, Right Hon. Baron, F.R.S., London.
1885 Ludwig, Professor, Leipsic.
1885 Paget, Sir James, Bart., F.R.S., London.
1885*Pasteur, Professor, Paris.
1885*Schroeder, Professor, Berlin.
1885 Simon, Sir J., F.R.S., London.
1885 Virchow, Professor, Berlin.
1885 Von Recklinghausen, Professor, Strasburg.

* Dead.

FELLOWS.

[*The figures prefixed denote the date of election. The figures appended to Names denote the number of Communications. Original Fellows are marked* †.]

1893 AHLWORTHY, S. W., M.D., The Manor House, Antrim-road, Belfast.

1885 ASHE, ST. GEORGE, L.R.C.P., L.R.C.S., Medical Officer No. 2 South City Dispensary, 66 Lower Baggot-street, Dublin.

1889 ATKINS, RINGROSE, M.D., Medical Superintendent, District Lunatic Asylum, Waterford.

† ATTHILL, LOMBE, M.D., Ex-President R.C.P., late Master Rotunda Lying-in Hospital, Monkstown Castle, Co. Dublin. [1]

† AUCHINLECK, HUGH ALEXANDER, F.R.C.S., Professor of Medical Jurisprudence, R.C.S., 7 Harcourt-street, Dublin.

1891 BAIRD, JAMES H., L.R.C.P., L.R.C.S., Assistant Surgeon R. I. Constabulary, 5 Blackhall-street, Dublin.

† BAKER, ARTHUR WYNDOWE WILLERT, M.D., F.R.C.S., Surgeon to the Dental Hospital of Ireland, Dental Surgeon to St. Mark's Ophthalmic Hospital, 18 Lower Fitzwilliam-street, Dublin.

† BALL, CHARLES BENT, M.D., F.R.C.S., Regius Professor of Surgery, Univ. Dub., Surgeon Sir P. Dun's Hospital, 24 Merrion-square, N., Dublin. [1]

† BANKS, SIR JOHN, K.C.B., M.D., F.R.C.P., Physician Richmond, Whitworth, and Hardwicke Hospitals, Regius Professor of Physic, Univ. Dub., Ex-President British Medical Association, Physician-in-Ordinary to Her Majesty the Queen in Ireland, 45 Merrion-square, East, Dublin.

1891 BARRY, PATRICK JOSEPH, L.R.C.P., L.R.C.S., 50 Merrion-square, East, Dublin. [1]

† BARTON, JOHN, M.D., Demonstrator of Anatomy, Royal College of Surgeons, 26 Upper Merrion-street, Dublin.

1892 BATE, ABRAHAM WM., M.B., F.R.C.S., Brigade Surgeon, Medical Staff, retired, 15 Harewood-terrace, Thornsby-on-Tees.

† BEATTY, JOSEPH, F.R.C.S., Surgeon Monkstown Hospital, 3 Howard-place, Kingstown.

† BEATTY, WALLACE, M.D., F.R.C.P., Assistant Physician Adelaide Hospital, 38 Merrion-square, E., Dublin. [2]

† BENNETT, EDWARD HALLARAN, M.D., F.R.C.S., Surgeon to Sir P. Dun's Hospital, Professor of Surgery Trinity College, 26 Lower Fitzwilliam-street, Dublin. [2]

† BENSON, ARTHUR HENRY, F.R.C.S., Ophthalmic Surgeon City of Dublin Hospital, Junior Surgeon St. Mark's Ophthalmic Hospital, 42 Fitzwilliam-square, W., Dublin.

† BENSON, J. HAWTREY, M.D., F.R.C.P., Consulting Physician City of Dublin Hospital, 57 Fitzwilliam-square, N., Dublin.

† BERNARD, WALTER, F.R.C.P., 14 Queen-street, Londonderry.

1887 BERRY, WM., L.R.C.P. Edin., F.R.C.S., Surgeon Royal Albert Edward Infirmary, Appleton Cottage, Great George-street, Wigan.

1887 BEWLEY, HENRY T., M.D., F.R.C.P., Lecturer on Medical Jurisprudence and Hygiene, Trin. Coll., Assistant Physician Adelaide Hospital, 26 Lower Baggot-street, Dublin.

1887 BIRMINGHAM, A., M.D., Professor of Anatomy Catholic University School, Cecilia-street.

1895 BLANEY, ALEX. J. M., M.A., M.B., B.Ch., and Fellow R.U.I., Professor of Biology, Cath. Univ. Med. Sch., and Asst. Surgeon Mater Misericordiæ Hospital, 7 North Frederick-street, Dublin.

1894 BOYCE, C. E., L.R.C.P. & S., 70 Lower Baggot-street, Dublin.

1891 BOYD, J. ST. CLAIR, M.D., Gynæcologist Ulster Hospital, 27 Victoria-place, Belfast.

† BOYD, MICHAEL AUSTIN, F.R.C.S., M.R.C.P., Physician Mater Misericordiæ Hospital, 30 Merrion-square, North, Dublin. [2]

† BROOMFIELD, HUMPHREY JOHN, F.R.C.S., Surgeon County Infirmary, The Elms, Carlow.

1891 BROWNE, HENRY PETER, M.R.C.P., F.R.C.S. Edin., Medical Officer Delgany Dispensary, West Malvern, Delgany, Greystones.

1883 BROWNE, J. WALTON, A.B., M.D., Surgeon to the Royal Hospital, 10 College-square, North, Belfast.

† BROWNE, ROBERT, F.R.C.S., Physician Maison de Santé, Hopeton, Terenure-road, Rathgar, Dublin.

1884 BURGESS, JOHN J., F.R.C.S., late Assistant Surgeon to the Richmond Hospital, 22 Westland-row, Dublin.

1884 BURKE, JOHN RICHARD, M.D., Deputy Inspector-General, Hospitals and Fleets, R.N., 22 Gardiner's-place, Dublin.

1891 BYRNE, HERBERT U., M.B., B.Ch., Univ. Dublin, Medical Officer No. 4 Dispensary District, South Dublin Union, 15 Upper Merrion-street, Dublin.

1891 BYRNE, LOUIS A., L.R.C.P., F.R.C.S., Surgeon Jervis-street Hospital, 20 High-street, Dublin.

† CAMERON, SIR CHARLES A., M.D., F.R.C.S., Professor of Chemistry Royal College of Surgeons, Superintendent Medical Officer of Health, City and County Analyst, Dublin, 51 Pembroke-road, Dublin. [1]

1895 CAMPION, THOMAS SPREAD, M.B. Univ. Dubl., Crescent, Lucan.

1895 CARMICHAEL, MAYNARD CAMPBELL, M.B., B.Ch., Univ. Dub., 10 Sallymount-avenue.

1884 **Chance**, Arthur, F.R.C.S., L.R.C.P., Surgeon to Mater Misericordiæ Hospital, 90 Merrion-square.

1897 **Coady**, D. P., F.R.C.S.I., L.R.C.P., L.M. Edinburgh, Johnstown, Straffan, Co. Kildare.

1897 **Coady**, Ed. T., L.R.C.P. & C.S., Clane, Co. Kildare.

1891 **Coffey**, Denis J., M.B., Demonstrator Catholic University Medical School, Dublin. [1]

1897 **Colahan**, Nicholas Whistler, M.D., M.Ch., Professor of Materia Medica and Therapeutics Queen's College, Villa, Galway.

1891 **Cole-Baker**, George, M.D., B.Ch., Assistant Master Coombe Lying-in Hospital, 28 Lower Baggot-street, Dublin.

1891 **Coleman**, James Byrne, M.B., B.Ch., Acting Physician to Richmond, Whitworth, and Hardwicke Hospitals, 15 Westland-row, Dublin. [1]

1883 **Cooper**, Austin N., F.R.C.S., care of Bruck, Castlereagh-street, Sydney, Australia.

† **Coppinger**, Charles, F.R.C.S., Surgeon to the Mater Misericordiæ Hospital, 11 Upper Merrion-street, Dublin.

† **Cosgrave**, E. MacDowel, M.D., M.Ch., F.R.C.P., Professor of Botany and Zoology R.C.S., Physician to Drumcondra Hospital, and to Cork-street Fever Hospital, 5 Gardiner's-row, Dublin. [2]

1883 **Cox**, Michael F., F.R.C.P., Physician St. Vincent's Hospital, 45 Stephen's-green, E.

1895 **Cox**, Robert H., L.R.C.P. & S., 53 Szechnen-road, Shanghai, China.

1889 **Craig**, James, M.D., F.R.C.P., Physician Meath Hospital, 35 York-street, Dublin.

† **Cranny**, John Joseph, M.D., F.R.C.S., Surgeon to Jervis-street Hospital, 17 Merrion-square, N., Dublin.

† **Croly**, Henry Gray, F.R.C.S., ex-President R.C.S., Surgeon City of Dublin Hospital, 7 Merrion-square, N., Dublin. [2]

1884 **Cronyn**, John G., L.R.C.S., L.R.C.P., Medical Officer South Dublin Union Workhouse, 4 Clare-street, Dublin.

† **Cruise**, Sir Francis Richard, M.D., F. & Ex-Pres. R.C.P., Consulting Physician Mater Misericordiæ Hospital, 93 Merrion-square, W., Dublin.

† **Cunningham**, D. J., F.R.C.S., F.R.S., Professor of Anatomy, University of Dublin, 43 Fitzwilliam-place, Dublin.

1893 **Daly**, F. B., M.B., T.C.D., Surgeon-Major A.M.S., 10 Eccles-street, Dublin.

1897 **Davis**, F. A. G., M.B., L.R.C.S., Demonstrator of Anatomy R.C.S., 30 York-street.

1893 **Dawson**, W. R., M.B. Univ. Dublin, Farnham House, Finglas, Dublin.

1891 **Dempsey**, Martin J. P., M.B., B.Ch., 184 Gt. Brunswick-street, Dublin.

† DENHAM, J. KNOX, L.R.C.P., Medical Officer to Donnybrook Dispensary, 25 Northumberland-road, Dublin.

1894 DICKSON, E. WINIFRED, M.B., F.R.C.S., Gynæcologist Richmond Hospital, Assistant Master Coombe Lying-in Hospital, 18 Upper Merrion-street, Dublin. [2]

1897 DIXON, A. FRANCIS, M.B. Dub., 23 Northbrook-road. [1]

1884 DONNELLY, THOMAS, M.D., F.R.C.S., Assistant Physician Richmond, Whitworth, and Hardwicke Hospitals, 14 Rutland-square, Dublin.

1887 DONNELLY, MICHAEL A., F.R.C.S., Surgeon Westmoreland Lock Hospital, 90 Stephen's-green, Dublin.

1895 DOWLING, JEREMIAH, L.R.C.P. & F.R.C.S., Nelson-street, Tipperary.

† DOYLE, JOSEPH P., L.R.C.P., Surgeon St. Joseph's Hospital for Sick Children, 23 Lower Fitzwilliam-street, Dublin.

1895 DRURY, H. C., M.D., B.Ch., Univ. Dub., F.R.C.P., Assistant Physician Sir P. Dun's Hospital, 16 Lower Fitzwilliam-street, Dublin. [1]

† DUFFEY, SIR GEORGE FREDERICK, M.D., F.R.C.P., Physician City of Dublin Hospital, Professor of Materia Medica R.C.S. Medical School, 30 Fitzwilliam-place, Dublin.

1893 DUNNE, F. J., M.B., R.U.I., late Resident Physician Mater Misericordiæ Hospital, 39 Stephen's-green, East, Dublin.

1885 DWYER, F. CONWAY, M.D., Surgeon Jervis-street Hospital, 4 Great Denmark-street, Dublin.

1889 EARL, HENRY CECIL, M.D., Assistant to Professor of Physiology, Trinity College, 75 Haddington-road, Dublin.

† ELLIS, GEORGE, F.R.C.S., M.B., 91 Lower Leeson-street, Dublin.

† EUSTACE, JOHN, M.D., L.R.C.S., Resident Physician Hampstead, Highfield, and Elmhurst Lunatic Asylum, Drumcondra, Co. Dublin.

1883 EVANS, WILLIAM R., M.D., L.R.C.S., 19 Merrion-square, N., Dublin.

1896 FAGAN, P. J., L.R.C.P. & F.R.C.S., Demonstrator of Anatomy, Catholic Univ. Med. Sch., 31 North Frederick-street, Dublin.

1887 FALKINER, NINIAN M'INTIRE, M.B., F.R.C.P., Medical Officer Grand Canal-street Dispensary, 81 Lower Leeson street. [1]

1888 FERGUSON, HENRY LINDO, M.D., F.R.C.S., Dunedin, New Zealand.

† FINNY, JOHN MAGEE, M.D., F.R.C.P., Physician Sir P. Dun's Hospital, King's Professor of Practice of Medicine, School of Physic, late President R.C.P., 36 Merrion-square, Dublin.

† FITZGERALD, CHARLES E., M.D., F.R.C.P., Surgeon-Oculist-in-Ordinary to the Queen in Ireland, Surgeon to National Eye and Ear Infirmary, 27 Upper Merrion-street, Dublin.

1891 FITZGERALD, FRANCIS CREIGHTON, L.R.C.P., L.R.C.S., Medical Officer Dispensary District, Newtownbutler, Co. Fermanagh.

† FITZGIBBON, HENRY, F.R.C.S., Ex-President Royal College of Surgeons, late Surgeon City of Dublin Hospital, 49 Merrion-square, E., Dublin.

1884 FLEMING, ROBERT H., M.B., late Assistant Physician Rotunda Hospital, 30 Lower Baggot-street, Dublin.

† FLETCHER, ROBERT VICARS, F.R.C.S., Resident Medical Superintendent District Lunatic Asylum, Ballinasloe, Co. Galway.

1891 FLYNN, ROBERT ALEXANDER, F.R.C.P., L.R.C.S., late Assistant Master Rotunda Hospital, Gynæcologist Drumcondra Hospital, 123 Lower Baggot-street, Dublin.

1886 FOTTRELL, WM. JOSEPH, L.R.C.S., Medical Officer North Dublin Union Workhouse, 2 Rutland-square, Dublin.

† FOY, GEORGE MAHOOD, F.R.C.S., Surgeon Drumcondra Hospital, 7 Cavendish-row, Dublin.

† FRANKS, KENDAL, M.D., F.R.C.S., late Surgeon to Adelaide Hospital and to Throat and Ear Hospital, Dublin, Kilmurry, Johannesburg, South Africa.

1887 FRASER, ALEC, M.B., Professor of Anatomy Royal College of Surgeons, Ireland,

† FRAZER, WILLIAM, F.R.C.S., 20 Harcourt-street, Dublin. [1]

1882 FREEMAN, WILLIAM HENRY, L.R.C.P. Lond., F.R.C.S., Surgeon Royal United Hospital, Bath, 24 Circus, Bath.

1891 GLENN, JOHN HUGH ROBERT, M.D., B.Ch., late Assistant Physician Rotunda Hospital, 24 Lower Baggot-street, Dublin. [1]

† GORDON, SAMUEL, M.D., F.R.C.P., Physician to the Richmond, Whitworth, and Hardwicke Hospitals, 13 Hume-street, Dublin.

1889 GORDON, S. T., L.R.C.P., L.R.C.S., Surgeon R. I. Constabulary, Depot, Phœnix Park, Dublin.

1893 GORDON, THOMAS EAGLESON, M.B. Univ. Dublin, late House Surgeon Adelaide Hospital, 53 Lower Baggot-street, Dublin.

1893 GRAY, ROBERT, F.R.C.P., L.R.C.S., Medical Officer Armagh Dispensary District, 4 Charlemont-place, The Mall, Armagh.

1895 GREEN, JAMES COMERFORD SULLIVAN, M.B., B.Ch., Univ. Dublin, Surgeon-Capt. A.M.S., Lower Leeson-street, Dublin. [*Resigned.*]

† GREENE, THOMAS WM. NASSAU, L.R.C.S., Beaumont, Church-road, Forrest-hill, London, S.E.

† GRIMSHAW, THOMAS WRIGLEY, M.D., F.R.C.P., Registrar-General for Ireland, Priorsland, Carrickmines, Co. Dublin.

1886 GUNN, CHRISTOPHER, M.D., M.R.C.P., Surgeon Jervis-street Hospital, 125 St. Stephen's-green.

† HAMILTON, EDWARD, M.D., F.R.C.S., Surgeon Steevens' Hospital, late President Royal College of Surgeons, 120 St. Stephen's-green, W., Dublin.

1892 HAMILTON, WM. COPE, L.R.C.S. & P., late Resident Surgeon Steevens' Hospital, 120 St. Stephen's-green, W., Dublin.

1889 HAMILTON, W. R. F., L.R.C.P., L.R.C.S., Medical Officer, Dispensary, Edenderry.

† HARLEY, ROBERT WILLIAM, L.R.C.S., 21 Pembroke-road, Dublin.

† HAUGHTON, SAMUEL (Clk.), M.D., F.R.C.P., F.R.S., School of Physic, Trinity College, Dublin. [Dead.]

† HAYES, PATRICK JOSEPH, F.R.C.S. Edin., Surgeon Mater Misericordiæ Hospital, Lecturer on Surgery in the Catholic University School of Medicine, 18 Merrion-square, Dublin.

† HAYES, RICHARD ATKINSON, M.D., F.R.C.S., Physician Steevens' Hospital, Physician for Diseases of Throat, National Eye and Ear Infirmary, 82 Merrion-square, South, Dublin.

1896 HEARD, R. LYNN, M.B., B.Ch., R.U., Munster Lodge, Monkstown.

† HEARN, RICHARD THOMAS, M.D., L.R.C.S., Medical Officer Rathmines Dispensary, South Dublin Union, 7 Belgrave-square, East, Rathmines, Dublin.

† HEMPHILL, WILLIAM D., M.D., F.R.C.S., Surgeon Co. Tipperary Gaol, South Riding, Visiting Physician Clonmel District Lunatic Asylum, Oakville, Clonmel, Co. Tipperary.

† HEPBURN, WILLIAM JOSEPH, F.R.C.S. Edin., Surgeon Meath Hospital and Co. Dublin Infirmary, 31 Upper Merrion-street, Dublin.

† HEUSTON, FRANCIS TYDD, F.R.C.S., late Professor of Anatomy Royal College of Surgeons, Surgeon Adelaide Hospital, 15 St. Stephen's-green, N., Dublin. [1]

1894 HEWITT, R. MORTON, M.D., B.Ch., Univ. Dublin, late House Surgeon City of Dublin Hospital, 74 Northumberland-road.

1895 HEWITT, THOMAS HENRY, L.R.C.P. & S., late House Surgeon City of Dublin Hospital, 23 Cambridge-terrace, Kingstown.

† HORNE, ANDREW JOHN, F.R.C.P., Vice-President R.C.P., Master National Lying-in Hospital, 94 Merrion-square, W., Dublin.

1883 JACOB, DAVID BALDWIN, M.D., F.R.C.S., Surgeon Queen's County Infirmary, Visiting Physician Maryborough District Lunatic Asylum Surgeon Queen's County Prison, Port Leix, Maryborough, Queen's Co.

1895 JELLETT, HENRY, M.B., B.Ch., Univ. Dublin, Assistant Master Rotunda Hospital. [1]

1885 JENNINGS, ULICK A., M.D., Brigade Surgeon, M.S., Retired, Surgeon Military Prison, Park View, Cork.

1886 JOYNT, C., M.D., Deputy Surgeon-General, Army Medical Staff, Retired, 21 Leeson Park. [*Resigned.*]

1893 JOYNT, RICHARD LANE, M.D. Univ. Dublin, F.R.C.S., Assistant Surgeon Meath Hospital, 84 Harcourt-street, Dublin.

† KENNY, JOSEPH E., L.R.C.P. Edin., City Coroner, 15 Rutland-square, Dublin.

1884 KIDD, FRED. W., L.R.C.S., Master Coombe Hospital, 17 Lower Fitzwilliam-street, Dublin. [1]

1889 KIDD, LEONARD, M.D., L.R.C.S., West Bridge, Enniskillen.

† KINKEAD, RICHARD JOHN, M.D., L.R.C.S., Lecturer on Medical Jurisprudence, Professor of Obstetric Medicine, Queen's College, Galway, Foster House, Galway.

† KNOTT, JOHN FREEMAN, M.D., F.R.C.S., late Demonstrator of Anatomy, School of Surgery, 34 York-street, Dublin.

1897 KYNSEY, SIR WILLIAM, C.M.G., F.R.C.P. & R.S., Oriental Club, London.

1885 LANE, JOHN LILLY, M.B., late Assistant Physician Rotunda Hospital, Gynæcologist City of Dublin Hospital, 37 Lower Baggot-street, Dublin.

1895 LAWLESS, GEORGE, L.R.C.P., F.R.C.S., Superintendent District Asylum, Armagh.

1884 LEDWICH, EDWARD L'E., L.R.C.S., College Anatomist Royal College of Surgeons, 30 Upper Fitzwilliam-street, Dublin.

1891 LENNON, EDWARD EMMANUEL, F.R.C.P., L.R.C.S., Senior Assistant Physician Meath Hospital, 30 Harcourt-street, Dublin.

† LENTAIGNE, JOHN VINCENT, F.R.C.S., Surgeon Mater Misericordiæ Hospital, 29 Westland-row, Dublin. [1]

1897 LETTERS, PATRICK, M.D., Valentia Island.

† LITTLE, JAMES, M.D., F.R.C.P., Physician Adelaide Hospital, Ex-President Royal College of Physicians, 14 Stephen's-green, North, Dublin.

1884 LUSH, WILLIAM VAWDREY, M.D., F.R.C.P. Lond., F.R.C.S. Eng., Physician to the Dorset County Hospital, 12 Frederick-place, Weymouth.

† MACAN, ARTHUR V., M.B., M.A.O., F.R.C.P., Professor of Midwifery T.C.D., 53 Merrion-square, Dublin.

1887 MACAUSLAND, RICHARD BOLTON, F.R.C.S., Surgeon Steevens' Hospital, 69 Fitzwilliam-square, Dublin.

† M'ARDLE, JOHN STEPHEN, F.R.C.S., Surgeon St. Vincent's Hospital and the Mullen Convalescent Home, 7 Merrion-street, Upper, Dublin.

1889 M'BRIDE, CHARLES, M.D., F.R.S. Edin., Parochial Medical Officer, Wigtown, Scotland.

† M'CULLAGH, JOHN, L.R.C.S., Demonstrator of Anatomy Catholic University, Ireland, Surgeon St. Joseph's Hospital for Children, 18 Mountjoy-square, East, Dublin.

1887 M'CUTCHEON, A. K. F., L.R.C.P., L.R.C.S., Physician Dramcondra Hospital, 3 Rutland-square, Dublin.

1891 McDONNELL, HERCULES HENRY, M.D., M.Ch., Surgeon Louth County Infirmary, Dundalk.

1883 M'KEOWN, WILLIAM A., M.D., Surgeon Eye and Ear Infirmary, 20 College-square, East, Belfast.

1887 MACNAMARA, P. J., M.D., F.R.C.S., Sarsfield's House, Kilmallock, Co. Limerick.

1887 McWeeney, E. J., M.D., M.Ch., Pathologist Mater Misericordiæ Hospital, 84 St. Stephen's-green, Dublin. [1]

1895 M'Hugh, Michael, M.A., M.D., Univ. Dub., L.R.C.S., Physician St. Vincent's Hospital, 25 Harcourt-street, Dublin.

† Madden, Thomas More, M.D., F.R.C.S., Edin., M.R.C.P., Obstetric Physician Mater Misericordiæ Hospital, Physician to St. Joseph's Hospital for Sick Children, 55 Merrion-square, South, Dublin.

1883 Marques, L. Pereira, M.R.C.P., L.R.C.S., Medical Officer Victoria Gaol Hospital, late Superintendent Lock Hospital, Hong Kong, China.

† Martin, William James, M.D., F.R.C.P. Edin., Physician Jervis-street Hospital and St. Joseph's Infirmary for Children, 17 Harcourt-street, Dublin.

1896 Martley, Francis C., M.A., M.D., Camb., M.R.C.S. Eng. & L.R.C.P. Lon., late House Physician St. Mary's Hospital, Upper Merrion-street, Dublin.

† Mason, Samuel Robert, M.B., F.R.C.S., Ex-Master Coombe Hospital, Professor of Midwifery Royal College of Surgeons, 22 Merrion-square, Dublin.

† Mason, Thomas Peter, M.B., F.R.C.S., Physician Mercer's Hospital, 45 Harcourt-street, Dublin.

1885 Maxwell, Patrick W., M.D., Ophthalmic Surgeon Jervis-street Hospital, Assistant Surgeon National Eye and Ear Infirmary, 19 Lower Baggot-street, Dublin.

† Meldon, Austin, F.R.C.S., Ex-President Royal College of Surgeons, Surgeon Jervis-street Hospital, 15 Merrion-square, N., Dublin. [1]

1883 Middleton, William Henry, L.R.C.S., Surgeon Westmeath Co. Infirmary, Mullingar, Co. Westmeath.

1894 Mills, W. T., L.R.C.P. & S., Medical Officer, Dispensary, Rhode, King's County.

1885 Molony, John, F.R.C.P., Master St. Patrick's Hospital for Lunatics, Dublin.

† Montgomery, Alexander Nixon, M.R.C.P., Secretary Vaccination Department, Local Government Board, 45 Upper Sackville-street, Dublin.

1894 Montgomery, Robert John, M.A., M.B., Univ. Dublin, F.R.C.S., 4 Gardiner's-row, Dublin.

1897 Mooney, H. C., M.B., F.R.C.S., 22 Lower Baggot-street.

† Moore, Charles Frederick, M.D., F.R.C.S., Certifying Surgeon, Medical Inspector of Seamen, 10 Upper Merrion-st., Dublin.

1894 Moore, Henry, L.R.C.P. & S., Surgeon Mercer's Hospital, late House Surgeon City of Dublin Hospital, late Medical Officer, Basuto Land, S. Africa, 40 Lower Baggot-street.

† Moore, John William, M.D., F.R.C.P., Physician Meath Hospital, Professor of Practice of Medicine Royal College of Surgeons, 49 Fitzwilliam-square, West, Dublin.

† MOORE, ROBERT HENRY, F.R.C.S., Surgeon-Dentist-in-Ordinary to His Excellency the Lord Lieutenant, 29 Upper Merrion-street, Dublin.

† MOORE, WILLIAM, M.D., F.R.C.P., Physician to Her Majesty the Queen, 67 Fitzwilliam-square, North, Dublin.

1897 MORRISON, F. SAUNDERSON, F.R.C.S., Roden-place, Dundalk.

1883 MURPHY, JOHN, L.R.C.S., Physician Mater Misericordiæ Hospital, 13 Merrion-square, Dublin.

† MURPHY, JOHN JOSEPH, L.R.C.P. Ed., 18 Harcourt-street, Dublin.

1886 MYLES, T., F.R.C.S., Surgeon Richmond Hospital, 32 Harcourt-street, Dublin. [1]

1883 NEWELL, F. T. PORTER, M.D. Univ. Dub., F.R.C.S., Medical Officer No. 2 Dispensary, South Dublin Union, 18 Lower Baggot-street.

1895 NICHOLSON, GEORGE FREDERICK, M.D., R.U.I., F.R.C.S., Surgeon-Major I.M.S., 53 Kenilworth-square, Rathgar.

† NIXON, SIR CHRISTOPHER, M.D., F.R.C.P., Physician to Mater Misericordiæ Hospital, 2 Merrion-square, N., Dublin.

† NIXON, FREDERICK ALCOCK, F.R.C.S., Surgeon Mercer's Hospital, 33 Harcourt-street, Dublin. [*Dead.*]

1889 NOLAN, MICHAEL JAMES, L.R.C.P., L.R.C.S., Resident Medical Superintendent Down District Lunatic Asylum, Downpatrick.

1885 NORMAN, CONOLLY, F.R.C.P., Medical Superintendent Richmond District Lunatic Asylum, Dublin.

1886 NORTON, JOHN J., L.R.C.P., Medical Officer Dispensary District, Leighlinbridge, Co. Carlow.

† NUGENT, GUY PERCIVAL L'ESTRANGE, M.D., F.R.C.P., Physician Richmond, Whitworth, and Hardwicke Hospitals, Registrar Royal College of Physicians, 19 Lower Fitzwilliam-street, Dublin. [*Dead.*]

1887 O'CALLAGHAN, ROBERT THOMAS ALEXANDER, L.R.C.P., F.R.C.S., 137 Harley-street, London.

† O'CARROLL, JOSEPH FRANCIS, M.D., F.R.C.P., Physician Richmond, Whitworth, and Hardwicke Hospitals, 27 Westland-row, Dublin.

1896 ODEVAINE, FERDINAND, F.R.C.S., Ophthalmic Surgeon St. Vincent's Hospital, 20 Harcourt-street, Dublin.

† O'GRADY, EDWARD STANER, F.R.C.S., Surgeon Mercer's Hospital, 33 Merrion-square, North, Dublin. [*Dead.*]

1883 O'KEEFE, PATRICK, M.D., Resident Medical Officer Mountjoy Convict Prison, Dublin.

1883 OLPHERTS, J. WYBRANTS, M.D., Medical Officer Downpatrick Dispensary District, The Villas, Downpatrick.

1883 O'NEILL, WILLIAM, M.D., M.R.C.P. Lond., Physician Lincoln Lunatic Hospital, 2 Lindum-road, Lincoln.

† ORMSBY, LAMBERT HEPENSTAL, M.D., F.R.C.S., Surgeon Meath Hospital, Surgeon National Orthopædic and Children's Hospital, 4 Merrion-square, West, Dublin.

1891 O'Rorke, Charles T. J., L.R.C.P., L.R.C.S., Medical Officer, Crossakiel Dispensary, Co. Meath.

1894 O'Sullivan, A. C., M.B., F.T.C.D., Lecturer on Pathology Trinity College, Pathologist Richmond Hospital, Dublin.

† O'Sullivan, Stephen, M.D., F.R.C.S., Professor of Surgery, Queen's College, Cork, Surgeon North Infirmary, 7 Sidney-place, Cork.

1896 O'Sullivan, Daniel, M.R.C.P., F.R.C.S., Surgeon-Major A.M.S., India.

† Oulton, Henry W., M.D., L.R.C.S., Assistant Surgeon Dublin Metropolitan Police, 6 North Frederick-street, Dublin.

1893 Parsons, Alfred Robert, M.B. Univ. Dublin, F.R.C.P., Physician City of Dublin Hospital, 27 Lower Fitzwilliam-street, Dublin.

889 Patteson, Robert Glasgow, M.B., F.R.C.S., Surgeon Meath Hospital, 20 Lower Baggot-street.

† Patton, Alexander, M.B., Resident Physician Farnham House and Maryville Private Lunatic Asylum, Farnham House, Finglas, Dublin. [*Resigned.*]

1895 Peacocke, Geo. F., M.D., B.Ch., Dub., 12 Lower Fitzwilliam-street.

1887 Pearson, Charles Yelverton, M.D., F.R.C.S. Eng., Professor of Materia Medica Queen's College, 1 Sydney-place, Cork.

† Pechey-Phipson, Mary Edith, M.D., L.R.C.P., Cumballa Hill, Bombay.

1885 Petit, Joseph, L.R.C.P., Medical Superintendent District Lunatic Asylum, Sligo.

1883 Pope, Frederick Alexander, M.B., Medical Officer Throat and Ear Hospital, 90 Pembroke-road, Dublin.

† Pollock, James Ferrier, M.D., F.R.C.P., Medical Officer Meath Industrial Schools, Avoca House, Blackrock.

1885 Potter, Henry, F.R.C.S., Brigade Surgeon Indian Army, 33 Belgrave-square, Rathmines.

† Pratt, Joseph Dallas, M.B., F.R.C.S., Surgeon Jervis-street Hospital, 25 Lower Fitzwilliam-street, Dublin.

1895 Price, Arthur George, M.B., B.Ch., Univ. Dublin, Greystones.

† Purefoy, Richard Dancer, F.R.C.S., Master Rotunda Hospital, 20 Merrion-square, Dublin.

† Purser, John Malet, M.D., F.R.C.P., Professor of Institutes of Medicine in the School of Physic, Physician Sir Patrick Dun's Hospital, 3 Wilton-terrace, Dublin.

† Quinlan, Francis John Boxwell, M.D., F.R.C.P., Consulting Physician St. Vincent's Hospital, Professor of Materia Medica and Therapeutics Catholic University, 29 Lower Fitzwilliam-street, Dublin.

1893 Rambaut, Daniel Frederick, M.D. Univ. Dublin, Assistant Medical Officer Richmond District Asylum, Dublin.

† REDMOND, JOSEPH MICHAEL, M.D., F.R.C.P., Physician to Mater Misericordiæ Hospital, Senior Physician to Cork-street Fever Hospital, 8 Clare-street, Dublin.

1891 ROCHE, ANTHONY, M.R.C.P., L.R.C.S., Lecturer on Hygiene Catholic University Medical School, 91 St. Stephen's-green.

1892 RUTHERFORD, WILLIAM, M.D., F.R.C.P.Ed., Visiting Physician District Asylum, Ballinasloe.

† SCOTT, CHARLES MASON, L.R.C.S., Rockingham, Kingstown, Co. Dublin.

† SCOTT, JOHN ALFRED, M.D., F.R.C.S., Professor of Physiology Royal College of Surgeons, 36 Lower Baggot-street, Dublin.

1887 SCOTT, JOHN HARRISON, M.B., F.R.C.S., Surgeon Adelaide Hospital, Fitzwilliam square, Dublin.

1886 SMITH, ALFRED J., M.B., Gynæcologist St. Vincent's Hospital, 32 Lower Baggot street, Dublin. [2]

1889 SMITH, JAMES, L.R.C.P., F.F.P.S. Glasg., Snugville, Shankhill-road, Belfast.

1895 SMITH, R. TRAVERS, M.B., B.Ch., Univ. Dub., 20 Lower Fitzwilliam-street.

† SMITH, WALTER GEORGE, M.D., Ex-President R.C.P., King's Professor of Materia Medica School of Physic, and Physician to Sir Patrick Dun's Hospital, 25 Merrion-square, Dublin.

† SMYLY, SIR PHILIP CRAMPTON, M.D., F.R.C.S., Surgeon Meath Hospital, Surgeon to the Hospital for Throat and Ear Diseases, 4 Merrion-square, North, Dublin.

† SMYLY, WILLIAM JOSIAH, M.D., F.R.C.P., late Master Rotunda Lying-in Hospital, 58 Merrion-square, S., Dublin.

† STACK, RICHARD THEODORE, D.M.D., Harvard, F.R.C.S., Dental Surgeon Adelaide Hospital, Surgeon to the Dental Hospital of Ireland, 10 Westland-row, Dublin.

1897 STAFFORD, T. J., L.R.C.S. & C.P., L.M.C.P., Medical Inspector Local Government Board, 9 Fitzwilliam-square.

1894 STEVENS, THOMAS G., L.R.C.P. & S., Assistant-Master Coombe Hospital, 23 Upper Fitzwilliam-street, Dublin.

† STOKER, SIR THORNLEY, M.D., late President R.C.S., Surgeon Richmond Hospital, Surgeon Swift's Hospital for Lunatics, 8 Ely-place, Dublin. [1]

† STOKES, SIR WILLIAM, F.R.C.S., Surgeon to the Queen in Ireland, Surgeon Meath Hospital, Professor of Surgery Royal College of Surgeons, 5 Merrion-square, North, Dublin. [1]

† STORY, JOHN BENJAMIN, M.B., F.R.C.S., Surgeon St. Mark's Ophthalmic Hospital, Ophthalmic Surgeon Steevens' Hospital, Professor of Ophthalmic Surgery R.C.S., 6 Merrion-square, N., Dublin.

1889 STORY, W. G., M.B., B.Ch., 8 Upper Fitzwilliam-street, Dublin.

† SWAN, ROBERT LAFAYETTE, F.R.C.S., Surgeon Steevens' Hospital and Dublin Orthopædic Hospital, 32 St. Stephen's-green, N., Dublin.

† SWANEY, HENRY ROSBOROUGH, M.B., F.R.C.S., Surgeon National Eye and Ear Infirmary, Dublin, Ophthalmic Surgeon Adelaide Hospital, 23 Merrion-square, North, Dublin.

1893 SYMES, WM. LANGFORD, L.R.C.P., L.R.C.S., 74 Merrion-square, South, Dublin. [1]

1893 SYMINGTON, JOHNSON, M.D. Edin., Professor of Anatomy Queen's Coll., Carlindean, Windsor-avenue, N., Belfast.

1885 TAIT, LAWSON, F.R.C.S. Eng., Surgeon Birmingham and Midland Hospital for Women, 7 The Crescent, Birmingham.

1895 TAYLOR, EDWARD HENRY, M.B., B.Ch., Univ. Dub., F.R.C.S., Surgeon Sir Patrick Dun's Hospital, 29 Lower Baggot-street, Dublin.

1887 THOMPSON, S. M., L.R.C.P., L.R.C.S., 34 Harcourt-street, Dublin. [1]

1897 THOMPSON, W. H., M.D., F.R.C.S. Eng., Professor of Physiology, Queen's College, Belfast.

1894 THOMPSON, W. J., M.D. Univ. Dublin, Demonstrator of Anatomy R.C.S., 27 Harcourt-street, Dublin.

† THOMSON, SIR WILLIAM, F.R.C.S., President R.C.S., Surgeon Richmond Hospital, 54 St. Stephen's-green, E., Dublin. [1]

1892 THUNDER, EDMUND, L.R.C.S. & P., Newbridge, Co. Kildare.

1891 TICHBORNE, CHARLES ROBERT CLARKE, LL.D., L.R.C.S., Professor of Chemistry, Pharm. Society, Ireland. [1]

† TOBIN, RICHARD FRANCIS, F.R.C.S., Surgeon St. Vincent's Hospital, 60 St. Stephen's-green, Dublin.

1889 TODD, H. ROSS, L.R.C.P., L.R.C.S., Medical Officer 10th District Croydon Union, Warlingham, Surrey.

1893 TWEEDY, ERNEST HASTINGS, L.R.C.P., L.R.C.S., late Assistant Master Rotunda Hospital, 71 Lower Baggot-street, Dublin.

† TWEEDY, HENRY COLPOYS, M.D., F.R.C.P., Physician Steevens' Hospital, 7 Clare-street, Dublin.

† USHER, ISAAC WILLIAM, L.R.C.S., Medical Officer Dundrum No. 1 Dispensary, Rathdown Union, Tudor House, Dundrum, Co. Dublin.

† WARD, MONTGOMERY ALBERT, M.D., F.R.C.S., Surgeon to Mercer's Hospital and to Maison de Santé, 19 Rathmines-road, Dublin.

† WHEELER, WILLIAM IRELAND, M.D., F.R.C.S., Surgeon City of Dublin Hospital, 32 Merrion-square, North, Dublin. [1]

1889 WHITLA, WILLIAM, M.D., Physician Royal Hospital, Professor of Materia Medica Queen's College, 8 College-square, Belfast.

1892 WILKINSON, JOHN B., L.R.C.S. & P., late Assistant Surgeon Richmond Hospital, 5 Usher's-island, Dublin.

1894 WILSON, H., M.R.C.P. & L.R.C.S., late Asst. Master Rotunda Lying-in Hospital, 33 Upper Merrion-street, Dublin.

1893 WOODS, ROBERT H., M.B. Univ. Dub., F.R.C.S., Throat Surgeon Richmond Hospital, 39 Merrion-square, Dublin. [1]

1894 WYNNE, ALBERT E., L.R.C.P. & S. Edin., late House Surgeon Mercer's Hospital, 4 Harcourt-street, Dublin.

1884 YOURELL, M. J., M.R.C.P., 26 Merrion-square, N., Dublin.

MEMBERS.

1892 BARKER, WM. OLIVER, L.A.H., Resident Medical Officer Grand Canal-street Dispensary, Dublin.

† BOYCE, JOS. W., M.B., Medical Officer Blackrock Dispensary District, Blackrock, Co. Dublin.

1897 BOYD, ALFRED E., M.B., 4 Winton-road.

1897 BURNES, RUDOLPH A. C., M.B., B.Ch., Dub., 1 St. John's-terrace, N. C. Road.

1893 CAMERON, JAMES, M.B. Edin., 13 Fettis-row, Edinburgh.

1887 COPE, GEO. PATRICK, L.R.C.P., L.R.C.S., late Assistant Resident Medical Superintendent Richmond District Lunatic Asylum, Medical Officer No. 3 Dispensary District, South Dublin Union, 43 Harrington-street.

1891 CREAN, JOHN J., L.R.C.S., Surgeon-Major Army Medical Staff, Dublin.

1892 DAY, J. MARSHALL, M.B. Univ. Dublin, Resident Medical Officer Cork-street Fever Hospital, Dublin.

† DELAHOYDE, J. O'CONNELL, L.R.C.S., Medical Officer No. 2 District, North Dublin Union, 47 Rutland-square, Dublin.

1891 ELLIOTT, W. S., M.B., B.Ch., Medical Officer of Constabulary, Malahide, Co. Dublin.

1894 EUSTACE, H. M., M.D., B.Ch. Univ. Dublin, Asst. Physician Highfield Private Lunatic Asylum, Highfield, Drumcondra.

1897 FLEURY, ELEONORE LILIAN, M.D., R.U.I., Richmond District Asylum, Dublin.

1894 FLOOD, FREDERICK L., L.R.C.P., L.R.C.S., Collegnes, Booterstown, Co. Dublin.

1885 GIBBS, RICHARD, L.R.C.S., Medical Officer Coolock Dispensary District, Winstonville, Fairview, Co. Dublin.

1889 GOULDING, H. BENSON, L.R.C.P., Edin. F.R.C.S., 16 Rathmines-road.

1897 GROGAN, GERTRUDE, M.B., B.Ch., R.U.I., 12 Clyde-road.

1894 HANRAHAN, E. F., M.B., B.Ch., R.U.I., Resident Medical Officer, Dispensary, High-street, Dublin.

1897 HAUGHTON, W. S., M.B., Dub. 113 Lower Baggot-street.

1897 HODGSON, E. C., L.R.C.P. & S I., 187 Great Brunswick-street.

1897 HUGHES, CHARLES, L.R.C.P. & S.I., 23 Westland-row.

1897 LUMSDEN, JOHN, M.B., B.Ch., B.A.O., Dub., 15 Lower Leeson-street.

1883 M'DERMOTT, P. A., F.R.C.S., Mount Clarence, Kingstown.

1892 M'GRATH, JAMES JOSEPH, L.R.C.S., L.A.H., 68 Lower Mount-street.

1891 MAGUIRE, KATHARINE M. N., M.B., B.Ch., 67 Merrion-square, South, Dublin.

1895 RAMSBOTTOM, ALFRED E. W., L.R.C.P., F.R.C.S., Box 51, Johannesburg, South Africa.

1885 RIDLEY, GEORGE P., L.R.C.S., L.R.C.P., Surgeon King's County Infirmary, Tullamore, King's County.

1885 SHAW, JAMES, L.R.C.S., 93 Talbot-street, Dublin.

† SPEEDY, ALBERT O., L.R.C.P. Ed., Medical Officer No. 3 Dispensary District, North Dublin Union, 28 North Frederick-street, Dublin.

1884 STRAHAN, MICHAEL, L.R.C.S., Medical Officer No. 2 North City Dispensary District, 38 Rutland-square, Dublin.

1896 TENNANT, ELIZABETH A., L.R.C.P. & S.I., 94 South Circular-road, Dublin.

1895 TURNER, DAVID, L.R.C.P. & S., late Resident Medical Officer Royal Hospital for Incurables, 68 Grosvenor-road, Rathmines.

1896 WAYLAND, R. S., L.R.C.P. & S., 54 South Richmond-street, Dublin.

1897 WHITTY, SURGEON-MAJOR, M.D., R.N., 35 St. Mary's-road.

1895 WINTER, WM. A., M.D., B.Ch. Dub., 5 Upper Leeson-street, Dublin.

1887 WYNNE, GEO. NESBITT, M.D., M.Ch., 31 Harcourt-street, Dublin.

STUDENT ASSOCIATES.

DRAPER, FRANCES, School of Medicine, Cecilia-street.

ENGLISH, ADELINE, School of Medicine, Cecilia-street.

HARPER, ISABEL WANTYN, 4 Grosvenor-place, Rathmines.

HOUSTON, WM., 15 Grantham-street.

JOHNSTON, H., Theberton.

MELDON, GEORGE P., 15 Merrion-square.

O'CONNELL, JOHN, School of Medicine, Cecilia-street.

RULES.

1. The name shall be, "ROYAL ACADEMY OF MEDICINE IN IRELAND." (1887.)

Constitution.

2. The Academy shall consist of Fellows, Honorary Fellows, Members, and Student Associates.

Management.

3. The affairs shall be managed by a Council, consisting of the President, Ex-Presidents (1898), the six Presidents of Sections, the General Secretary and Treasurer, the Secretary for Foreign Correspondence, six Secretaries of Sections, and eight Councillors, being two representatives from the Medical, Surgical, Obstetrical, and Pathological Sectional Councils respectively.

Meetings.

4. The Meetings shall be General and Ordinary.

Publication of "Transactions."

5. The "Transactions" shall be published by the Council, subject to the provisions hereinafter contained.

Original Fellows and Members.

6. All the Members of the present Societies (Medical, Surgical, Obstetrical, and Pathological) shall be Original Fellows or Members, without entrance fee, on payment of the annual subscription on or before 31st December, 1882.[a]

Fellows.

7. Fellows of the Royal College of Physicians of Ireland, and of the Royal College of Surgeons in Ireland, shall be admitted, without ballot, on payment of the entrance fee and the subscription for the current year. All others, being Registered Medical Practitioners not directly or indirectly engaged in the sale of drugs, shall be proposed by two Fellows, and elected by ballot by the Council.

8. Candidates shall be proposed at one Meeting of the Council, and balloted for at the next—one black bean in four to reject.

8A. That all Rules referring to the admission of Fellows, Members, and Student Associates shall be interpreted as referring to Ladies as well as Gentlemen.

Privileges of Fellows.

9. Fellows only shall be eligible for office in the Academy. They shall have the privilege of attending all Meetings of the Academy, of making Communications, and of voting and speaking at such meetings. They shall also receive a copy of the "Transactions."

[a] Those who have paid a Life Subscription to any of the above Societies will be admitted to the privilege of Fellows on payment of Member's subscription.

10. These privileges shall not be exercised by any Fellow in arrear with his subscription.

Honorary Fellows.

11. Honorary Fellows, limited in number to 25, may be nominated by the Council, and elected, on motion at a General Meeting of the Academy by a majority of at least two-thirds of those present and voting.

Members.

12. Any Registered Medical Practitioner may be elected as a Member, the election to be conducted in the same manner as that of Fellows.

Privileges of Members.

13. Members shall have the privilege of attending the Ordinary Meetings of the Academy, of making Communications, and of taking part in debate. They can purchase the "Transactions" at cost price.

Student Associates.

14. Registered Medical Students may be elected Student Associates for the period of one year. The Subscription must be paid before election, and the Council may elect without notice of motion.

15. Student Associates shall have the privilege of attending the Ordinary Meetings of the Academy.

Annual Subscription.

16. Fellows shall pay £2 2s., and Members £1 1s. Student Associates shall pay 5s. The Subscription shall become due on the 1st of October in each year, and if the Subscription be not paid on or before the first Meeting in February, the defaulter shall cease to belong to the Academy, unless the delay shall be accounted for to the satisfaction of the Council. No Fellow shall vote at the Annual General Meeting who has not paid his subscription for the year. Medical Officers of the Army and Navy, and Registered Medical Practitioners not residing within 15 miles of Dublin, are eligible as Fellows of the Academy on payment of the entrance fee, and an annual Subscription of £1 1s.

Entrance Fee.

17. After admission of Original Fellows, all Fellows shall pay an entrance fee of £1 1s.

Council.

18. The Council shall meet on the first Wednesday in the month throughout the Session, or oftener should they see occasion—five to form a quorum.

19. Notice of all Extraordinary Meetings shall be transmitted by the Secretary to every Member of the Council. The President or any five Members of Council may call an Extraordinary Meeting of the Council. The Council shall determine questions by vote, or by division if so demanded, the President having a casting vote only. Any regulation of the Council shall have the force of a law, until submitted to the next General Meeting. The Council shall have the power of filling up any vacancies which may occur in the list of Officers of the Academy, except that of President, before the Annual General Meeting. If a vacancy in the office of President should occur, the General Council shall summon a Special General Meeting of the Academy to fill such vacancy. (1888.)

Sectional Councils.

20. There shall be six Sectional Councils elected by the Annual General Meeting in October, termed respectively—the Medical, the Surgical, the Obstetrical, and the Pathological, the State Medicine, and the Anatomical and Physiological Councils.

21. No Fellow shall be eligible as a candidate for election on more than two Sectional Councils, but no Fellow shall be eligible as a candidate for election on both the Medical and Surgical Sectional Councils. (1888.)

22. Each Sectional Council shall consist of the President of the Section and ten Members, one of whom shall act as Secretary to the Section; except the State Medicine and Anatomical and Physiological Councils, which shall each consist of a President and six Members. (1888).

Meetings of Sectional Councils.

23. Each Sectional Council shall meet on a fixed day at least one week before the Ordinary Meeting of their Section, three to form a quorum.

Powers.

24. Each Sectional Council shall have the power of making any such arrangements as it thinks necessary to carry on the work of the Ordinary Meetings which are under its charge, provided that such arrangements do not interfere with the general laws of the Academy; and any Rules laid down by such Council shall have the force of laws at the Ordinary Meetings under its charge, until submitted to the General Council.

25. Each Sectional Council shall have the power of filling up any vacancies that may occur among its Members until the Annual General Meeting.

Committee of Reference.

26. The Council shall appoint a Committee of Reference, to report upon morbid growths and other specimens exhibited before the Academy; of this Committee the Exhibitor shall, for the occasion, be a Member.

Officers.

27. A President, to be elected by the Annual General Meeting in October, and to hold office for three years.

28. The Presidents of the Colleges of Physicians and Surgeons for the time being shall be the Presidents of the Medical and Surgical Sections. The Presidents of the other Sections shall be elected by the Fellows at the Annual General Meeting, and shall hold office for two years. (1888.)

29. One General Secretary and Treasurer to be elected at the Annual General Meeting.

30. It is expedient that a fixed salary (of one hundred guineas) shall be paid yearly to the General Secretary in consideration of the fact that the editing of the "Transactions" is part of his duties.

31. One Honorary Secretary for Foreign Correspondence to be elected at the Annual General Meeting. (1888.)

32. The Councillors for each Section to be elected at the Annual General Meeting. Each Sectional Council shall elect two Members to act on the

General Council, except in the case of the Sections of State Medicine and Anatomy and Physiology. (1888.)

33. Two Members in each Sectional Council shall retire annually, and be ineligible for re-election for one year, except in the Council of the Section of Anatomy and Physiology, in which only one shall retire (Oct., 1896).

34. Six Secretaries, one for each Section, to be appointed by the Sectional Councils.

35. At all elections after the year 1882, any Fellow desirous of nominating a candidate for election shall, at least one fortnight before the Annual General Meeting, forward an application to the General Secretary to enter the name of such Fellow on the list of candidates for office, provided that the Fellow so nominated shall have consented to act. (1891.)

36. That all elections shall be by ballot, but Fellows residing more than 15 miles from Dublin, and those incapacitated from attending by illness (to be certified), may record their votes by ballot papers, sent to the presiding officer in sealed envelopes provided for that purpose (Oct., 1896).

Duties of Officers.

37. *The President* shall preside at the Annual and Special General Meetings and at General Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888.)

38. *The Presidents of Sections* shall preside at the Ordinary Meetings of the Academy, and shall also preside at the Sectional Council Meetings. In the absence of the President, the Chairman shall be appointed by the meeting. (1888).

39. *The General Secretary* shall attend all General Meetings of the Academy and General Council. He shall take minutes of such meetings, to be read at the following meeting.

40. He shall receive and have charge of all papers intended for publication in the "Transactions" of the Academy, after they have been handed over to him by the Secretaries of the several Sections.

41. He shall, on receiving notice from the Secretary of a Section, send out to all the Members notices of the title or titles of the paper or papers for the next Ordinary Meeting, with the name or names of the authors, and, so far as possible, of the subjects for Exhibition, with the names of the Exhibitors.

42. He shall arrange for the Exhibition of specimens and the reading of papers, which are forwarded to the Academy by those who are absent, or are not members.

43. The General Secretary and Treasurer shall receive all moneys, and lodge the same in bank to the account of the Academy, and all cheques shall be signed by the Treasurer and one other Councillor.

44. The Accounts shall be audited by two Fellows, not Members of Council, to be appointed by the President at some meeting previous to the Annual Meeting.

Duties of Secretaries of Sections.

45. To attend the Meetings of the Council of the Section and the Ordinary Meetings of the Academy, under the management of said Council, and to take minutes at such meetings, to be read at the next following meeting of that Section.

46. To keep such papers as the Sectional Councils deem worthy of publication, for the purpose of handing them over to the General Secretary.

47. To inform the Secretary of the Committee of Reference of any specimens referred to that Committee, and to transfer the specimens to that Secretary.

48. To give notice to the General Secretary, one week previously to the meeting, of the titles of papers for the evening, the names of the authors, and, so far as possible, the objects for Exhibition, with the names of Exhibitors, so that the General Secretary may inform the Members.

Meetings.

49. The Annual General Meeting to take place on the last Friday in October, for the election of Officers and Members of Council, and for the general business of the Academy.

50. Due notice of the meeting shall be given by the Secretary to all Members at least three weeks previously. (1891.)

51. No motion involving a change of these Rules shall be brought before this meeting except one week's notice thereof shall have been given by the Secretary to each Member.

52. The President may—and shall forthwith, on receiving a requisition signed by seven Fellows, at any time—on giving one week's notice, summon a Special General Meeting, for the consideration of particular business, the nature of which must be specified in the letter of summons convening the meeting, and at such meeting no other business can be transacted. In the event of the President being unable, from any cause, or declining, to summon a Special General Meeting of the Academy, it shall be in the power of the General Council to summon such meeting. (1888.)

Ordinary Meetings.

53. The communications to be submitted to the Ordinary Meetings shall be grouped under the following heads :—Medicine, Surgery, Pathology, Obstetrics, State Medicine, and Anatomy and Physiology ; and the conduct of such meetings shall be in the hands of the several Sectional Councils, each Sectional Council to have the management of the Ordinary Meeting in rotation, as arranged by the General Council. (1888.)

54. The Ordinary Meetings shall be held on every Friday evening, from the first Friday in November until the last Friday in May, inclusive, at eight o'clock, except during the Christmas and Easter recesses.

55. All Fellows, Members, and Student Associates attending the meetings, shall write their names in the attendance book.

56. Any Fellow or Member may introduce two Visitors by cards obtained from the Sectional Secretaries.

57. Officers of the Army or Navy Medical Departments shall, on presenting their cards, be admitted to the Ordinary Meetings of the Academy.

58. No communication shall exceed twenty minutes in its delivery, nor any speech thereon ten minutes, except by permission of the Chairman. No one shall speak twice upon the same communication, except the author, who has the right of reply.

58 (a). A paper by any other than a Fellow or Member of the Academy shall not be read before the Academy unless the author of such a communication shall have obtained permission to do so from the Council of the Section before which the communication is proposed to be read. (1892.)

Ordinary Meetings.—Order of Business.

59. (1.) Chair to be taken at 8 30 p.m.

(2.) Chairman to read list of specimens, &c., exhibited by card, together with the names of the Exhibitors.

(3.) No Pathological Specimen shall be exhibited at any Section other than the Pathological and Obstetrical, except by card. This Exhibition shall not exclude any subsequent communication regarding it at the Pathological Section.

(4.) There shall be no Exhibition of Specimens by card in the Obstetrical or Pathological Sections.

(5.) Any member shall have liberty to exhibit any recent specimen at any of the meetings of the Obstetrical Section, provided it illustrates any question in gynæcology.

(6.) At the meetings of the Obstetrical Section recent specimens may be exhibited, and the President shall invite discussion thereon, provided that such exhibition of specimens or discussion, if any, thereon, must terminate at 9 o'clock, p.m., but that, if necessary, they may be resumed after the papers for the evening have been read and discussed.

(7.) Chairman to ask if any member has any observations to make or motion to propose relative to any living specimen on the List of Exhibition.

(8.) Chairman to call upon the author of the first paper on the list to read his paper.

(9.) Chairman to call upon members to discuss the paper, or, at his discretion, to take any other paper or papers on the list relating to the subject, and have the discussion subsequently on all such papers collectively.

(10.) When the last paper has been discussed, the Chairman to ask if any member desires to speak upon any of the specimens exhibited by card.

(11.) After the discussion upon any specimen, the Exhibitor has the right of reply.

Regulations regarding the Exhibition of Specimens by Card.

60. (1.) Any member may exhibit by card at any Ordinary Meeting, except at the meeting of the Pathological and Obstetrical Sections. At the meetings of the Pathological all specimens must be presented and described *viva voce*, and debate may be invited thereon.

(2.) Notice shall, if possible, be given to the General Secretary, or the Secretary of the Section, on or before the previous Ordinary Meeting.

(3.) Specimens must be in the room at 7 45 on the night of Exhibition.

(4.) Specimens for Exhibition by card shall be open for inspection at 8 p.m.

(5.) A card, containing all particulars for publication, shall be placed with the Specimen. Cards for this purpose are to be obtained from the Secretary.

(6.) The Exhibitor should be present, and he shall furnish further details if asked for.

(7.) Every Exhibitor shall submit the Specimen or Specimens on view to the Committee of Reference, if the meeting so decide.

Exhibition of Pathological Specimens.

61. No lengthened reference to treatment shall be allowed upon any Specimen, except by the express permission of the Chairman. Whenever it has been agreed that a Specimen exhibited at a Sectional Meeting of the Royal Academy of Medicine in Ireland shall be sent to the Reference Committee to report thereon as to its nature, the Exhibitor is to retain the custody of the specimen until he shall be summoned to a meeting of said Committee to be convened by its Secretary, on an early day, when he will attend and submit it for examination. (1889).

By-laws concerning "Transactions."

62. The "Transactions" shall consist of such Communications made to the Academy by or through Fellows or Members as may be deemed by the General Council suitable for publication; also, of discussions of importance or interest arising out of such Communications.

63. All Communications accepted by the Academy become the property of the Academy, but authors may also print their Communications, subsequent to the reading of the same before the Academy, in any publication in addition to the "Transactions." Papers shall be handed to the Secretary of the Section immediately after they have been read. (1891.)

64. The "Transactions" for the year shall be presented to all Fellows of the Academy who have paid their Annual Subscriptions.

65. The "Transactions" may be purchased by Members at cost price.

66. The Publication Committee of each Section shall meet not later than the Tuesday after each meeting of the Section, for the purpose of abstracting the proceedings—the abstract to be placed in the printer's hands on same evening, and forwarded to the editors of medical journals with the least possible delay. (1888.)

67. Contributors of papers are requested to send their papers to the Academy printer early enough to allow of their being put in type before the meeting, and read in proof. (1888.)

68. That on the evening of the day of meeting of the Sectional Council, when the papers for the next meeting have been decided upon, a circular be sent to each contributor informing him :—

(1.) That he is expected to be ready or else take his place at the bottom of the list.

(2.) That he must have an abstract ready with his paper, otherwise he will be noted in the published proceedings in such form as the Publication Committee think fit.

69. The General Council is empowered to defray the expenses in whole or in part of any illustrations which it may consider advantageous to the elucidation of the papers published by the Academy.

70. An abstract (prepared by the author) of each communication made at the Academy, along with a report of the discussions thereon, shall be furnished to the editors of such medical journals as may desire to publish them, and the authors of such communications shall be empowered to publish their papers *in extenso* in any periodical or periodicals they may think fit, such communications also to appear in the "Transactions," provided the Council consider them worthy of insertion.

Expulsion of Fellow or Member.

71. Expulsion of a Fellow or Member can take place only at a General Meeting of the Academy, on the motion of the Council, if two-thirds of the Members present shall vote for the same by ballot. Of such ballot the Council must give at least fourteen days' notice in writing to every Fellow of the Academy.

New Laws.

72. New Laws, or alterations in existing Laws, can be proposed only at the Annual General Meeting. Any Fellow proposing such alteration shall give notice to the General Secretary at least ten days before the General Meeting in October.

REPORT.

The General Council begs to report that the number of Fellows for the Session 1896–7 was 246; of Members, 36; of Student Associates, 5. The Fellows increased by 10; the Members by 2; and the Student Associates by 1.

On the requisition of a number of Fellows of the Academy, a Special General Meeting was held on April 30th, for the purpose of considering the propriety of voting a sum of money out of the Funds of the Academy to entertain the Anatomical Society of Great Britain and Ireland at a Conversazione.

Professor Cunningham, however, informed the Meeting that as the President of the Academy had invited all the Members of the Anatomical Society to dinner on June 10th, and various entertainments had been arranged for the other days of the Congress, it would not be necessary to ask the Academy to give a Conversazione, and the proposition was accordingly withdrawn.

The Academy was honoured by an Address from Prof. His, of Leipzic, which was delivered on June 11th in the Theatre of the Royal Dublin Society, kindly lent for that purpose. The Address was largely attended, and is published in the volume of Transactions for the past Session.

A Sub-Committee of the Council was appointed in December last to investigate into the possibility of coming to some arrangement with the *Dublin Journal of Medical Science*, by which that Journal could be constituted the official organ of the Academy. Several meetings were held, but no definite conclusion has yet been arrived at.

At a meeting of the Council held January 6th, it was resolved that the President should be authorised to convey to Lord Lister the sincere congratulations of the Academy on his elevation to the peerage. The President accordingly wrote to Lord Lister, and received from him a letter of thanks, which has been entered on the Council Minutes.

At a meeting of the Council held May 5th, it was resolved to present an Address to Her Majesty the Queen on the occasion of the completion of the 60th year of her reign. The following Address was accordingly drawn up, and forwarded to the Home Office, in Whitehall, for approval:—

ADDRESS.

"MAY IT PLEASE YOUR MAJESTY,

"WE, the President, Council, and Fellows of the Royal Academy of Medicine in Ireland, desire humbly to approach Your Majesty to offer our warm and heartfelt congratulations on the completion of the 60th year of Your Majesty's glorious and memorable reign.

"As members of a scientific body, formed for the study of the laws of health and disease, we gratefully acknowledge the gracious encouragement Your Majesty and the Members of the Royal Family have always given to our profession, and we feel that it must be a source of gratification to Your Majesty to know that the longest reign in the history of the United Kingdom has been marked by such a general increase in health and well-being, that the average duration of human life in these countries has never been so long as at present.

"We beg respectfully to assure Your Majesty of our loyal attachment to your Throne, Person, and Family, and we pray that Your life and health may long be preserved to enable You to rule over a prosperous and contented people."

Her Majesty was graciously pleased to request H. R. H. the Prince of Wales to receive the Address on Her behalf,

and on July 21st the President, the General Secretary, the Secretary for Foreign Correspondence, Sir George F. Duffey, Dr. J. Craig, and Mr. Heuston attended at St. James's Palace, when H. R. H. received the Address, and returned the following reply:—

REPLY.

"On behalf of the Queen, my dear Mother, I thank you for your loyal and dutiful Address, and for the affectionate congratulations which you tender on the completion of the 60th year of Her Reign.

"It is a source of profound joy to the Queen to receive the expressions of devotion to Her Person and Family, which are offered by Her subjects throughout the Empire; She is gladdened by the thought that the 60 years of Her Reign have been years of progress in knowledge, and of increase in prosperity; and She prays that, by the blessing of Almighty God, She may always live in the hearts of Her loving and beloved people."

The following resolution of the Section of State Medicine was forwarded to the Corporation of Dublin on June 2nd by the General Secretary, by order of the General Council:—

"That the Section of State Medicine of the Academy of Medicine is of opinion that the Sanitary Authority of the Dublin District should provide accommodation for convalescents from infectious diseases, with the twofold object of checking the spread of such diseases, and of relieving the congestion of hospitals during epidemics. The Section is further of opinion that provision should be made by above authorities to provide like accommodation for small-pox cases."

The Council deeply regret to record the loss which the Academy has sustained during the past Session by the deaths of Dr. G. P. L'E. Nugent and Mr. F. A. Nixon, two of the original Fellows of the Academy.

Volume XIV. of the "Transactions" has been forwarded to the following:—

Lancet	London.
British Medical Journal	Do.
Medical Press	Dublin.
Hospital Gazette	London.
Dublin Medical Journal	Dublin.
London Medical Recorder	London.
Edinburgh Medical Journal	Edinburgh.
Glasgow Medical Journal	Glasgow.
Liverpool Medical Journal	Liverpool.
Bristol Medical Journal	Bristol.
Asclepiad	London.
International Medical Journal	Do.
Annals of Surgery	Do.
Provincial Medical Journal	Leicester.
Birmingham Medical Review	Birmingham.
Sanitary Record	London.
Practitioner	Do.
College of Surgeons	Dublin.
Do.	London.
Do.	Glasgow.
Trinity College	Dublin.
Royal University	Do.
Queen's College	Belfast.
Do.	Galway
Do.	Cork.
Royal Dublin Society	Dublin.
College of Physicians	Do.
Do.	Edinburgh.
Do.	London.
Faculty of Physicians and Surgeons	Glasgow.
Victoria University	Manchester.
University College	London.
Harveian Society	Do.
Pathological Society	Do.
Clinical Society	Do.
Medical and Chirurgical Society	Do.
Apothecaries' Hall	Do.
King's College	Do.
University	Do.
Do.	Glasgow.
Do.	Edinburgh.
Do.	Durham.
Do.	St. Andrews.
Do.	Aberdeen.
University College	Dundee.
Do.	Melbourne.
Do.	Adelaide.
Do.	Calcutta.
Do.	Bombay.

University College - - - - St. Petersburg
Do. - - - - - Paris.
Do. - - - - - Vienna.
Do. - - - - - Berlin.
Do. - - - - - Brussels.
Do. - - - - - Bologna.
Do. - - - - - Madrid.
Do. - - - - - Amsterdam.
Do. - - - - - Christiania.
Do. - - - - - Stockholm.
Do. - - - - - Toronto.
Do. - - - - - Quebec.
Do. - - - - - New York.
Do. - - - - - Philadelphia.
Do. - - - - - New Zealand.
Do. Library - - - - Tokio, Japan.
Medical Institute - - - - Birmingham.
Dr. Ashby - - - - - Do.
Director-General Billings, Washington, U.S.
Journal de Médecine et de Chirurgie (M. Lucas, Championière), Paris.
Archives de Chirurgie, 108 Boulevard St. Germain, Paris.
Archiv für Klinische Chirurgie, Berlin.
Centralblatt für die medicinischen Wissenschaften, Berlin.
Zeitschrift für Chirurgie, Berlin.
The Australian Medical Gazette, Sydney, N.S.W.
New York Medical Journal, 72 Fifth Avenue.
Journal, American Medical Association, Chicago.
Bulletin de l'Académie Royale de Médecine de Belgique, Brussels.
Medical Journal, Brooklyn.
Naturforschende Gesellschaft, Dr. Rudolf Martin, Seefeldstrasse 119, Zurich.
Academy of Medicine, 17 West 43d Street, New York.
Library, College of Surgeons, Edinburgh.
„ British Medical Journal, 429 Strand, London.
„ Medico Chirurgical Society, Bristol.
Sheffield Medical Journal, 17 Eyre Street, Sheffield.
Archives Cliniques de Bourdeaux, 46 Cours du Jardin-public, Bordeaux
Medical Society of Victoria, Melbourne (Meyer and Metzler, Great Portland, Street, London).
Quarterly Medical Journal, Dr. Coching, 277 Glossop-road, Sheffield.
Medical Library Association, 19th and Stout Street, Denver, Colorado, U.S.
Charlotte Medical Journal, Charlotte, N. C., United States.
Society of Medicine, care of Dr. J. V. Wichman, Copenhagen.
University of Sydney, care of Young J. Pentland, 38 West Smithfield, London, E.C.
Editor, Archivio d'Ortopedia, via S. Calimbro 31, Milan.
Library, Medical Society, Royal University, Upsala.
National Library, Dublin.
Journal of Comparative Neurology, Denison University, Granville, Ohio, U.S.
Dr. Stockwell, Medical Age, Detroit, Michigan, U.S.
Archivio di Ortopedia (Dr. Pietro Panzeri, Instituto dei Rachitici, Milan).
Journal of Comparative Neurology, Dr. C. L. Herrich, Granville, Ohio, U.S.A.

General Treasurer's Report for the Session 1896–97.

RECEIPTS.

	£	s.	d.
To Balance in Bank - - - -	24	4	5
„ Subscriptions - - - -	508	8	0
„ Dividends on £596 2s. 4d., at 2¾ per Cent.	3	19	3
„ „ „ „ -	15	17	0
„ „ £155 1s. 10d., at 2½ per Cent.	0	19	5
„ „ „ „ -	3	17	8
Total - - - -	£557	5	9

EXPENDITURE.

				£	s.	d.
By General Secretary - - -				105	0	0
„ Printing, Stationery, and Postage :—						
C. Chambers -	£2	12	6			
Browne and Nolan	1	5	0			
Gerrard Bros. -	0	4	0			
Falconer - -	60	12	1			
				64	13	7
„ Transactions, Vol. XIV. :—						
Fannin & Sons -	148	17	8			
F. Huth - -	19	19	6			
				168	17	2
„ Reporters - - - - -				43	1	0
„ Servants - - - - -				20	10	0
„ Groceries - - - - -				19	13	4
„ Sundries - - - - -				4	8	5
„ Address to Her Majesty the Queen -				3	3	0
„ Royal College of Surgeons - - -				15	15	0
„ Royal College of Physicians - -				15	15	0
„ Balance in Bank - - - -				96	9	3
Total - - - -				£557	5	9

We have examined the Accounts and Vouchers, and certify the same to be correct.

JAMES CRAIG, M.D., F.R.C.P.
ROBERT H. WOODS, M.B., F.R.C.S.

October 12th, 1897.

TRANSACTIONS

OF THE

ROYAL ACADEMY OF MEDICINE IN IRELAND.

ADDRESS UPON THE DEVELOPMENT OF THE BRAIN.[a]

By PROFESSOR WILHELM HIS,

OF LEIPZIG.

Mr. President and Gentlemen,

It may be a little bold to deliver before you an English address, as I shall scarcely be able to express myself conveniently in your language. I must place all the responsibility on my dear friend, Mr. Cunningham; he has induced me to accept the honoured invitation of the Royal Academy of Medicine, and also to speak on the development of our brain, a theme which he could have treated himself as one of our best authorities.

It cannot be my task to enter into the high architectural complexities of the noblest of our organs; but, proceeding from embryological observation, I shall try to obtain some general points of view on the fundamental principles of its organisation.

Since the researches of C. E. v. Baer, and of R. Remak, we know that the nervous centres of vertebrates arise from the primary ectoderm as a canal of an epithelial character. It is also well-known that the brain-part of the neural canal forms, in the first instance, three enlargements—the fore-

[a] This Address was delivered in the Theatre of the Royal Dublin Society to the Fellows of the Royal Academy of Medicine, on the 11th June, 1897.

brain, the mid-brain, and the hind or rhombic brain. These three parts can be distinguished very early, even before the canal is closed. From the time of their first formation they follow each other in a curve, or rather in a broken line. Owing to this curve the extremity of the brain canal is turned ventrally, and it extends beyond

FIG. 1.

Photographic reproduction of black-board drawing made by Prof. His for his Lecture.

B. Diagrammatic representation of early condition of the neural tube, showing the manner in which it becomes bent on itself.

A. Diagrammatic representation of a mesial longitudinal section through the head and neck of a human embryo. The brain-flexures and the optic vesicle are seen, and the manner in which the fore-brain is bent around the anterior extremity of the notochord and foregut is indicated. The early heart is shown bulging out in front of the foregut. The different sub-divisions of the brain are marked off from each other by dotted lines.

In both diagrams (A as well as B) a dotted line running in the long axis of the neural tube indicates the separation of the alar from the basal lamina of the lateral wall.

the extremity of the notochord and of the alimentary canal (Fig. 1).

The primary formation of the head is the same in all craniote vertebrates. It shows a ventrally free, and a fixed part—the fore-head and the back-head; the latter encloses the heart. The fore-head is formed by a frontal and a facial piece. The frontal portion contains only the fore-brain, while the facial piece includes the blind end of the foregut and the extremity of the notochord. There is a small field between the frontal and the facial pieces of the head, where the base of the brain, the extremity of the notochord, and the extremity of the foregut join together. This field is of great morphological importance, and it shows the place where the hypophysis is afterwards to be formed. So long as the junction between the foregut, the brain, and the notochord exists there is no room for a hypophysis. But this junction is a temporary one, and when it has been interrupted the ectodermal pouch of the hypophysis enters into the gap.

The next advance in the development of the brain brings about the separation of the eyeball from the fore-brain, the division between the hemispherical and the thalamic parts of it, and also the segmentation of the hind-brain from the medulla oblongata. The boundary between the two last-mentioned parts is marked by a flexure called the pontine flexure (Fig. 6, p. 11; Fig. 14, Pl. II.).

Before following further changes, I have to say some words about the histological development of the neural canal. The wall of the neural canal shows already, before it is closed, two different kinds of elements—(1) cells extending through the whole thickness of the wall, and forming a columnar epithelium; and (2) round germinal cells placed on its inner side.

The columnar epithelium undergoes a special transformation. Between the inner parts of its cells arises a regular

succession of open clefts whilst the tops of the single columns remain united by a fine limiting membrane. The peripheral parts of the cells form a sponge-like network with irregular meshes. The whole formation is called the myelosponge, and its elements are termed the spongioblasts (Plate I., Fig. 10 and Fig. 11).

The round germinal cells are dispersed through the clefts of the internal columnar part of the myelosponge. Many of these cells are in full process of multiplication, and show the different stages of karyokinesis. Others grow out in the form of pear-shaped corpuscles (Plate I., Figs. 10 and 11; Plate II., Fig. 12). Each of these sends out a tapering protoplasmic prolongation, directed outwards towards the surface of the medulla. These pear-shaped corpuscles are the neuroblasts, and their prolongations constitute the origin of nerve-fibres. The formation of neuroblasts is confined to the two thick lateral walls of the neural canal. The roof and the floor of the tube are thinner than the side-walls, and they furnish only epithelial cells, or spongioblasts.

The primary neuroblasts have merely neural processes; the dendrites or ramified processes arise later than the nerves, and it seems that these attain very slowly their full development. A certain number of the newly-formed nerves leave the neural canal to reach muscles, whilst others remain in the thickness of its wall. We find therefore motor fibres and internal or intra-medullary fibres. The motor fibres all come from the ventral half of the canal; the internal fibres start partly from its dorsal, partly from its ventral half. Some of them are commissural fibres, and cross the mid-line; others enter into the longitudinal columns of the medulla.

All sensory nerves, also the fibres of the olfactory, the optic, and the auditory nerves arise outside the neural canal. The sensory nerves spring from the bipolar cells of

the spinal ganglia; the fibres of the olfactory nerve from the epithelial cells of the olfactory groove, and the true optic fibres from the neuroblasts of the retina. All these nerves reaching the neural canal from without apply themselves to its surface, and form longitudinal bundles. The dorsal column of the spinal cord, the spinal roots of the trifacial nerves, the auditory and the optic nerves are all in their first appearance in loose connection with the neural canal.

Fig. 2.

Photographic reproduction of a black-board drawing made by Prof. His for his Lecture.

It gives a diagrammatic representation of a transverse section through the spinal portion of the early neural tube. It is sufficiently described in the text.

A section through the brain or the spinal cord of a human embryo of about four weeks gives the plainest representation of the typical architecture of nervous centres. We find the motor fibres starting from the ventral half of the canal (Plate III., Fig. 16), the sensory fibres reaching the surface of its dorsal half, and internal fibres forming connecting arches (Fig. 2). These three kinds of fibres represent the groundwork of all central organisation: they

supply the paths from the periphery to the centre, those from the centre to the periphery, and the paths from one part of the centre to another. Every fibre coming from a single cell forms with its cell a histological and physiological unit, which we now call a *neuron*.

I return to the history of the brain. The most striking feature in its morphological development is the general increase of its flexures; that increase shows many variations in the different classes and orders of vertebrates. Generally the two limiting flexures of the mid-brain precede the others in their progression. The base of the fore-brain is brought near to that of the hind-brain. A narrow cleft between these two parts leaves the place for the dorsum sellæ (Fig. 6, p. 11; Plate II., Fig. 14); this cleft persists even in the adult brain. By the new nomenclature it is called the interpeduncular groove, and it shows an anterior and a posterior recess, corresponding to the two primary limits of the mid-brain.

The flexures of the rhombic brain follow a little later in their development. The pontine flexure at the superior, and the neck-flexure at the inferior end of the medulla oblongata become very considerable, and the neural canal assumes thenceforth a zigzag-like conformation (Plate V., Fig. 25). There is also a constant but feeble flexure in the isthmus or narrow part of the rhombic brain. At the same time the neural canal loses its primary simplicity. Its parts begin to acquire more characteristic forms, and we can soon distinguish all the principal parts of the developed brain.

Before entering into any details it will be necessary to follow the transformation of the primary longitudinal laminæ. If we leave aside the purely epithelial or ependymal laminæ of the neural canal, its roof and its floor, we find its wall consisting of a ventral or basal, and of a dorsal or alar lamina. As we have already seen the basal

lamina contains the motor centres, whilst the dorsal lamina receives the sensory nerves. The boundary-line between these two laminæ of the wall is generally well marked in the brain canal; its terminal end can be followed through

Fig. 3.

Photographic reproduction of a black-board drawing made by Prof. His for his Lecture.

It gives a diagrammatic representation of a transverse section through the rhombic or hind-brain (medulla oblongata), and is specially intended to show the alar and basal longitudinal laminæ of the lateral wall of the tube. Into the alar lamina the sensory fibres from the cells of the ganglion of the tenth nerve (vagus) are entering, so as to form a longitudinal column of fibres cut transversely and lying close to the surface. This is the "solitary tract" which later becomes deeply buried within the substance of the medulla. The neuroblasts of the nuclei of origin of the twelfth (hypoglossal) and of the eleventh or spinal accessory nerves are seen sending their motor fibres out from the medulla.

[In this drawing Professor His makes use of the English word "zone," and he thus follows his distinguished American friend, Professor C. S. Minot, of Boston. (See Minot's "Human Embryology," p. 606). But "zone" is altogether an inappropriate word to apply to either of the two

the third ventricle to the optic stalk, or optic recess. The further development of these two laminæ is disproportionate in the different parts of the brain. In man and in the higher vertebrates the basal lamina diminishes as we ascend from the lower to the higher parts; the motor centres begin to be discontinuous and to fail, and the last of them—the oculomotor centre—belongs to the mid-brain. The basal lamina of the fore-brain has no motor centres and is very reduced. It contains the mammillary body and the infundibulum, and is separated from the thalamus by a shallow furrow. We call it now the hypothalamus.

The alar lamina of the brain canal remains feeble in the medulla oblongata, but its growth is mighty in the higher parts, and results in the development of the cerebellum and of the cerebral hemispheres. In lower vertebrates the basal or hypothalamic lamina of the fore-brain is of more importance than in the higher ones, whilst the alar or hemispheric part remains less developed.

In the rhombic brain the alar lamina furnishes the restiform and the olivary bodies, the cerebellum and the superior peduncles, whilst the basal lamina gives the floor of the fourth ventricle. In the embryo of four weeks the rhombic brain when seen in transverse section has a pentagonal form, the epithelial roof being broad and the basal and alar laminæ forming together an obtuse angle. The motor centres lie near to the surface of the basal laminæ, and their fibres leave the canal wall

portions of the neural tube in question. The term "zone" could only be properly given to an area or strip of the neural wall which is placed at right angles to the long axis of the tube and which extends, girdle-like, around its circumference. The districts referred to, however, so far from presenting this relation, run parallel to the long axis of the tube. Still further, by using the word "zone" we do not give a correct translation of the German term (*Platte*) employed by Professor His himself. *Flügelplatte* (alar lamina) and *Grundplatte* (basal lamina) are the names used by Professor His to designate the two thick portions of each lateral wall of the neural canal. In the text the term "zone" has been changed to "lamina."]

in two lines—a mesial one and a lateral. Near the lateral motor line is the place where the sensory fibres come from without to the surface of the medulla, to form longitudinal bundles of fibres. As typical instances we can cite the two motor lines of the hypoglossal and the spinal accessory nerves, and close by the sensory roots of the pneumogastric nerves (Fig. 3). The longitudinal bundle receiving the sensory fibres of pneumogastric and of glossopharyngeal nerves is called the solitary tract; its primary position is very superficial. In the fully

Fig. 4.

Photographic reproduction of a black-board drawing by Prof. His to explain the folding over of the rhombic lip of the rhombic or hind-brain in the region of the fourth ventricle. It represents a diagrammatic transverse section through the medulla oblongata.

developed medulla the solitary tract, and also the nuclei of the hypoglossal and accessory nerves, are separated from the ventral surface by a broad layer of tissue containing nerve-cells and also nerve-fibres running in all directions. How is this layer formed? The dorsal border of the alar lamina stands straight and erect during its primary stages, but it afterwards begins to bend outwards in the form of a longitudinal fold, which projects in a lip-like way along the entire length of the rhombic brain (Fig. 4). This rhombic lip (Rautenlippe) is the origin of the cerebellum and of the olivary bodies. (Plate II., Fig. 13.)

The formation of the cerebellum is not very difficult to

understand, but that of the olivary bodies presents a greater amount of complexity, and is one of the most interesting processes in the history of the brain. The rhombic lip becomes adherent to the remaining part of the alar lamina, and sends out a multitude of neuroblasts which wander towards the middle line and pass on the ventral side of the basal lamina, superficial to the solitary tract, and the motor nuclei. These neuroblasts and their arched

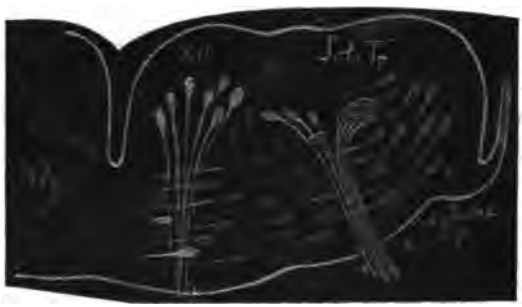


FIG. 5.

Photographic reproduction of a black-board drawing by Prof. His to show the migration of neuroblasts from the region of the rhombic lip—a developmental process by means of which the solitary tract becomes deeply buried within the substance of the medulla. This figure represents a later stage of the medulla than that depicted in Fig. 3, and, as in the latter, it shows the neuroblasts which give origin to the motor fibres of the hypoglossal and spinal accessory nerves.

fibres are supported by the outgrowing myelosponge of the basal lamina, and they form a thick layer containing together with other nuclei those of the olivary bodies. Afterwards longitudinal fibres of different origins and new arch-like fibres join them to produce the final organisation.

The medulla gives a good example of the relation between the local and the chronological succession of the layers of the brain. The oldest layer of the medulla is the floor of the fourth ventricle, with its nuclei. It is followed

in the first instance by the reticular formation, and afterwards by the layer containing the olivaries and other nuclei. Last of all come the pyramids and the outer arcuate fibres (Fig. 6A).

In the pons Varolii similar relations between the chronological and local succession of layers are to be established. For instance, we can cite the primitive position of the

Fig. 6.

Figure obtained of the head and neck of a human embryo of five weeks from a series of consecutive sections by the reconstruction method. It exhibits the different sub-divisions of the brain at this period, and shows particularly well the thalamic brain with the early outgrowth from it which ultimately forms the cerebral hemisphere.

motor nuclei of the trifacial nerve and of its spinal sensory root, and compare it with the later position, which shows these parts covered by thick layers of transverse and longitudinal fibres. In the mid-brain the tegmental part is the first formed. It presents itself as a thick prominence of the basal canal wall. In this prominence we early distinguish the nucleus of the oculomotor nerve and the posterior longitudinal bundle; then comes also a reticular formation, followed by the substantia nigra. The fibres of the crusta are partly very late formations.

I beg leave to limit my remarks concerning the thalamic brain to the demonstration of photographs, and to pass immediately to the primitive history of the cerebral hemispheres. The cerebral hemispheres are formed by the terminal piece of the alar brain lamina, and this place can be determined very early as an angular field situated between the optic vesicle, the terminal, and the dorsal border of the neural canal (Fig. 1, p. 2). This field has two free borders and one fixed; the free borders being the terminal and the dorsal ones, the fixed border remaining in continuity with the thalamic brain and with the stalk of the optic vesicle.

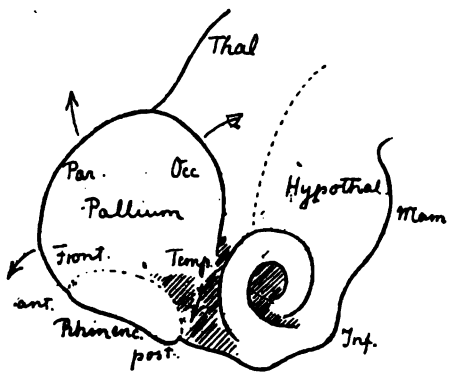


FIG. 6A.

The primary hemispheric brain is undivided. The separation of two hemipheres by a longitudinal fissure begins in the human embryo at the end of the first month. From this time we distinguish also the place of the nasal brain or rhinencephalon of Sir W. Turner (Fig. 6A). The rhinic brain is situated immediately beneath the terminal border of the brain tube. Between its two halves appears the thin lamina cinerea. It represents the terminal section of the alar brain lamina; the suture of the basal lamina is enclosed in the optic chiasma and in the anterior wall of the infundibulum.

The nasal brain is limited by Sir William Turner's rhinic fissure, and it is divided by another fissure, the fissura prima, into an anterior and a posterior part. The anterior part furnishes the olfactory bulb, tract, and trigone, and the field of Broca (area Brocæ). The posterior part remains as the wall of the anterior perforated space, and as the gyrus subcallosus (peduncle of the callosum). In the developed brain the anterior part of the rhinencephalon is fixed to the frontal lobe, the posterior part to the temporal lobe; these relations will enable us to distinguish from the earliest times the position of the hemispheric lobes. It is easy to see that the frontal lobe is directed partly towards the anterior, partly towards the dorsal border of the hemispheres. The temporal lobe is represented by the inferior part of the fixed border, the occipital lobe by its superior part, and the parietal lobe by the posterior part of the dorsal border (Fig. 6A).

The rhinic fissures and the fissura prima are folds of the brain-wall—and on its internal side they form three prominences, the first traces of a striate body. This part of the brain-wall increases very quickly, and forms the well-known prominence in the floor of the lateral ventricle. During many months the striate body shows its three branches, and remains in close relation to the lobes of the nasal brain.

The problem of brain formation has its histological as well as its morphological side, and we have to consider both. To a large extent the changes in the form of the brain depend upon the increase of its histological elements; but the increase of these elements is again ruled by the form of the surrounding parts, inasmuch as cells and nerves need free room to extend themselves.

To understand the complicated interlacement of the different processes, it is necessary to follow their chronological succession. Time is the mightiest factor in every

development. As we have seen before, the local position of the layers of the brain depends on it; but it possesses far, even much more, influence on the physiological organisation of the neural system. Some examples may explain this:—In the spinal cord, the myelosponge is the first formed part of the tissues, its inner clefts furnishing the room for the germinal cells and for the neuroblasts. The meshes of the outer network are only pervious to nerve-fibres, but not to nerve-cells. On this account the different density of the myelosponge in its inner and outer layers determines the separation of the grey and white matter of the spinal cord. In the brain things seem to be more complicated. We find there evident cell-emigrations from the inner to the outer side of the canal wall.

The formation of nerves begins with the motor fibres; the sensory fibres follow soon afterwards. These two kinds of fibres are not only formed very early, but this formation is also soon brought to an end. All the later generations of neuroblasts furnish only internal connecting fibres. The cells are formed during the first two or three months of the embryonic life, but the fibres going out from them can grow indefinitely long, before they reach their destination. Also the dendritic or ramified processes of central nerve-cells and the collateral fibres grow very slowly, and we can scarcely say how long their formation and their increase can continue. The regeneration of sectioned nerves shows that even during later life nerves can continue to grow.

In the whole neural canal, especially in the brain, the alar lamina is slower in its development than the basal lamina. But as it grows continually through long periods of time enormous organs like the cerebral hemispheres may be produced. In every case the new formation of neural elements must necessarily be a process of superaddition.

The cells and the nerve-fibres once formed persist: they are joined by other cells and fibres formed afterwards. The older and the younger cell formations become connected together; and, by the succession of different generations, the whole system will become more and more complicated. In all these things time will multiply the most intimate connections between the different parts. The medulla oblongata is the first formed of the brain parts. All the later formed parts enter into connection with it, and finally it is the most central and most complicated of all these parts. We may, therefore, make the generalisation, that during the earlier periods of development the single elements of the neural system in their rough connections are formed, and that only during the later developments the intimate organisation of the whole system and the dependence of all its parts upon each other is established.

All the higher functions of our brain depend upon the anatomical and physiological superposition of neural centres. By physiologists such superpositions have been presumed many years ago, but only the inquiries of recent times have given full evidence of their anatomical disposition. The iron methods of Weigert, the silver methods of Golgi and of Cajal, and the methyline blue methods of Ehrlig have armed anatomical workers with strong weapons. We can now trace the nerve-fibres from their beginning to their final terminations; we can distinguish the fibres entering into a neural centre from the fibres issuing from it. The rich and very unexpected system of collateral fibres has been uncovered before our eyes—a system which enables a single fibre to enter into relations with long series of terminal points. By the new anatomical methods applied to the undeveloped brain Flechsig and Held could, for instance, follow the auditory

paths from their first origin in the cochlear ganglion to the nuclei of the medulla oblongata. From thence new paths are established to the upper olivary bodies, and to the lower quadrigeminal body, and at last come the paths from these centres of the mid-brain to the cerebral cortex of the temporal lobe. There are at least four different cell stations, every one being a centre with many particular connections, and all united together in a harmoniously working apparatus.

But the brightest victory of anatomical methods is the analysis of the cerebral cortex given in these last years by Prof. Flechsig. The controversies concerning the localisation or non-localisation of cerebral functions are not new. Gall on the one side, Flourens on the other, were in former periods the champions of the two parties. Since that time the physiological inquiries of Hitzig, Ferrier, Horsley, Schäfer, and many others, have given the decision for the localisation, and the experiments of Mr. Horsley have taught us how precisely the centres of different muscles can be isolated in the cortex. Prof. Flechsig on his side pursuing, for more than twenty years, by anatomical methods the course of central nerve-bundles, has at last succeeded in limiting in a sharp way the different special sensory centres of the cortex—the centres of the optic, the auditory, the olfactory nerves, and those of the nerves of general sensibility. Each of these centres has its own particular field on the brain surface—the optic centre in the occipital, the auditory centre in the temporal, the olfactory centre in the frontal lobe, while the centres of general sensibility are situated partly in the frontal and partly in the parietal lobe. All the centres receive projection fibres from the internal capsule. They are separated one from the other by large fields of cortex, which are without any connection with projection fibres. The sensory cortex-centres show

medullated fibres from the time of birth, or soon afterwards. In the rest of the cortex the medullated fibres appear later, and they develop from the side of adjacent sensory centres. These parts of the cortex are regarded by Prof. Flechsig as centres of association, and it may be remarked that of the two principal centres of association the parietal one is placed between the optic, the auditory, and the tactile centres, whilst the other, the frontal one, has only few direct connections with the sensory centres.

I cannot go farther in following the consequences of these new discoveries, but I think that we anatomists feel profoundly satisfied by the fact that discoveries of such general importance can be made by our science. We rejoice not only in what we know, but even much more in the perspective of coming knowledge. Anatomy is not a closed science, as it was asserted some time ago. It is a science full of life, and one of the most promising branches of general biology.

EXPLANATION OF PLATES.

The figures in the following five plates are reproductions of some of the more important lantern slides which were shown by Professor His during his Lecture. Figures 7-17 (Plates I.-III.) are photographs from the original preparations. Figures 20-27 are photographs from wax models:—

PLATE I.

Fig. 7.—Mesial longitudinal section through the neural tube of an early chick embryo. The aperture or neuropore (*n.p.*) at the anterior end of the tube is still open.

Fig. 8.—Mesial longitudinal section through the head-end of a slightly older chick embryo, showing the intimate connection between the anterior end of the notochord (*n.*) and the hinder part of the floor of the fore-brain. Note that the neuropore is closed.

Fig. 9.—Early embryo of a dog-fish. The upper end of the figure shows the enlargement and bending of the brain-part of the neural tube.

Fig. 10.—Microphotograph of a portion of a transverse section through the neural tube. The inner ends of the spongioblastic columns are observed to be flattened out and joined together to form a fine limiting membrane. This is seen in the upper part of the section. Between them three germinal cells, two on the left with karyokinetic formations, may be seen.—Human embryo of four weeks.

Fig. 11.—In this microphotograph the neuroblastic cells are dark-coloured, and in connection with many of these the tapering axis-cylinder processes are seen. It will be observed that these processes are growing towards the surface (*i.e.*, the lower part of the figure) through the mesh-work of the myelosponge.—Human embryo of four weeks.

PLATE II.

Fig. 12.—Microphotograph of a portion of a transverse section through the whole thickness of the neural tube. The arrangement of the neuroblasts and of the spongioblasts is well seen. The limiting membrane on the inner aspect of the tube is uppermost in the figure.—Human embryo of four weeks.

Fig. 13.—Transverse section through the early medulla showing the rhombic lip.

r.l.—Rhombic lip. *G.x.*—Ganglion of the vagus.

Fig. 14.—Mesial section through the head of a human embryo of the seventh week. It shows the great expansion of the cavity of the brain-part of the neural tube as well as the strongly-marked brain flexures.

Fig. 15.—Photograph of a human embryo of six weeks. The different subdivisions of the brain shining through the thin head-coverings are well seen, and the cervical, pontine and mid-brain flexures observed, in section, in Fig. 14, are prominently brought out. Compare with Fig. 6 in the text (page 11).

PLATE III.

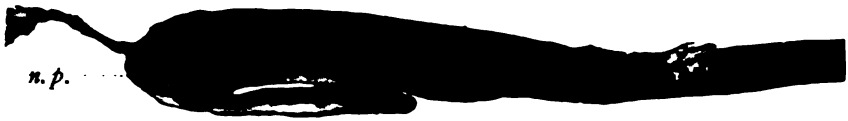
Fig. 16.—Transverse section through the spinal part of the neural tube of a human embryo of four weeks. It shows the early condition of the roots of a spinal nerve. A diagrammatic representation of this is given in Fig. 2 in the text (p. 5).

c.c. Central canal of neural tube.

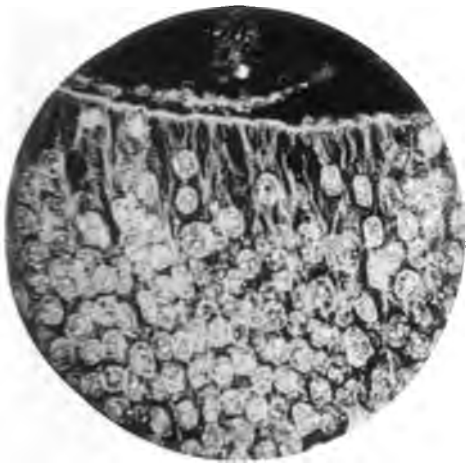
m.r. Motor fibres from the neuroblasts in the wall of the tube, growing out to form the anterior nerve-root.

S.G. Spinal ganglion, from the cells of which the fibres grow into the wall of the neural tube and thus form the posterior nerve-root.

Fig. 17.—Section through a portion of the wall of the brain tube at the level of the origin of the fifth cranial nerve. It has been found necessary to turn this figure round on its side so as to make it fit into the plate.

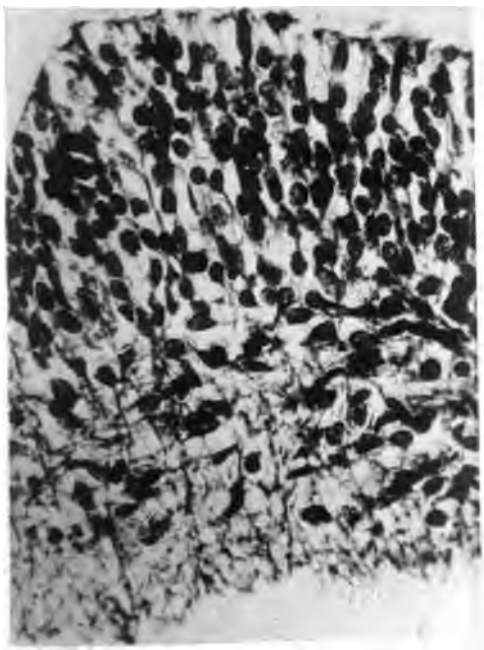


7



10

8



11

9

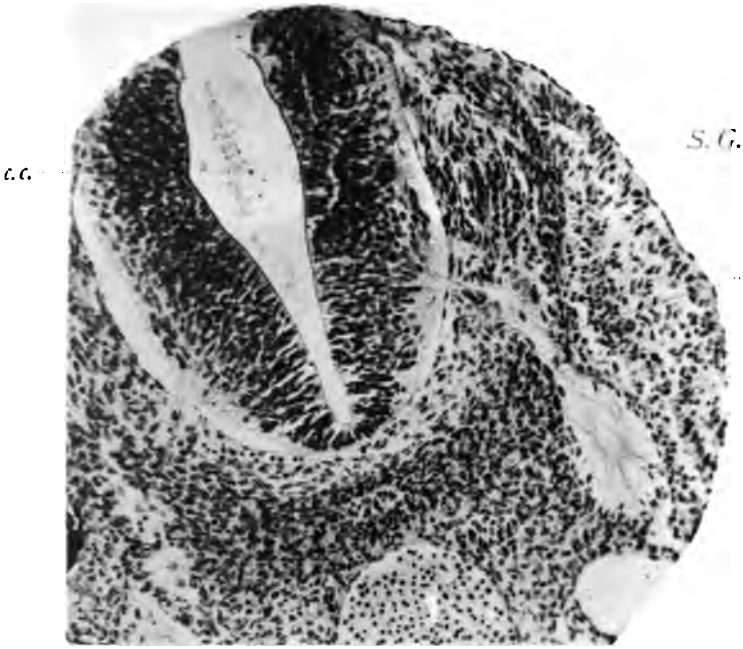
12

..... *r. l.*

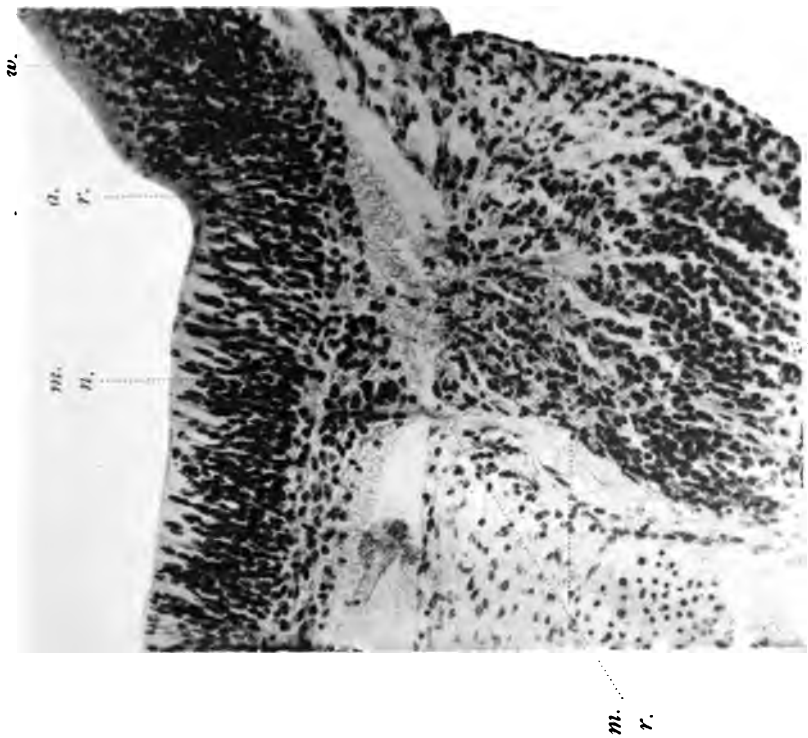
G. X.

13

15



16



17

18

19

20

22

21

23

W. His

24

25

26

27

28

W. HIS.

w. Wall of the brain-tube.

G.G. Gasserian ganglion.

s.r. Sensory root, formed of fibres growing out from the cells of the ganglion and entering the wall of the neural tube.

a.r. The same fibres as represented by *s.r.* cut transversely owing to their having turned downwards to form the spinal root of the fifth nerve.

m.n. Neuroblasts of the motor nucleus of the fifth nerve giving origin to the motor fibres—*m.r.*—which are seen growing out from the neural wall.

m.r. Fibres of the motor root of the fifth nerve.

Human embryo of four weeks.

PLATE IV.

Figs. 18 & 19.—Reconstruction drawings of the head and brain of two human embryos at different periods of development to show the brain flexures.

Fig. 20.—Interior view of the brain-tube of a human embryo of four weeks (model).

Fig. 21.—Outer surface of the brain-tube of a human embryo of four weeks (model).

Fig. 22.—Interior of the brain-tube of a human embryo of four and a half weeks (model).

Fig. 23.—Outer surface of the brain-tube of a human embryo of four and a half weeks (model).

PLATE V.

Fig. 24.—Outer surface of the brain of a five weeks' human embryo (model).

Fig. 25.—Interior of the same.

Fig. 26.—Mesial section of the brain of a human embryo of the third month (model).

Fig. 27.—The same brain seen from the outside, with the lateral ventricle opened (model).

Fig. 28.—Mesial section of the adult brain to compare with Fig. 26, and to show how similar the basal part of the thalamic brain is in both. The basal portion of the wall of the third ventricle is shaded more lightly than the rest.

GUAIACOL IN PYREXIA.

By HENRY C. DRURY, M.D., F.R.C.P.I.;
Assistant Physician, Sir Patrick Dun's Hospital;
Temporary Physician, Cork-street Fever Hospital.

[Read in the Section of Medicine, November 20, 1896.]

It is my wish this evening to draw the attention of the Academy to some observations I have made on the effect of guaiacol upon pyrexia in general. I do so, not with the object of lauding it as a specific for reducing temperature, but with the hope that the results that I have obtained will be considered by some of the practising physicians here sufficient warrant to justify their giving it a fair trial themselves in suitable cases.

So far as I have gone, I cannot but believe that we have in guaiacol another and a valuable weapon with which to attack that foe which so often kills its victim, quite apart from the disease which gave the foe its origin.

A mild attack of rheumatic fever may suddenly become complicated by hyperpyrexia. What more terrible emergency are we called upon to meet? And are our weapons so perfect that it is not worth while considering if we can add another to our armoury?

The weapon and its method of use are so simple, while its mode of action is so obscure, that incredulity seems to seize on those who are merely told of its power, without having seen it demonstrated, or having tried it for themselves. I believe that in Medicine, as in Arts, simplicity of methods and their application generally add to their utility.

I may, perhaps, remind you what guaiacol is, and, in doing so, cannot do better than quote Dr. W. G. Smith in the "Year Book of Treatment" for 1889, p. 329:—"Creasote

is a composite substance containing various constituents, of which guaiacol, $C_6H_4 \begin{cases} OH \\ OCH_3 \end{cases}$, is the most important, 60 to 90 per cent. of beechwood creasote consisting of this ether. Guaiacol is a colourless liquid, with an aromatic smell, slightly soluble in water, readily so in alcohol and fixed oils."

The drug may be obtained from any first-class apothecary. I have used that obtained from the Apothecaries' Hall.

For several years past reports have frequently appeared in medical papers on the use of creasote in the treatment of phthisis. In an article by Sahli,* published in the *Lancet* (1887, II., 1287), he recommends guaiacol instead of creasote, recognising it to be the active constituent, and also that it had several advantages over the crude drug. Since then guaiacol has been frequently reported upon, but chiefly in connection with the treatment of phthisis. At first it was given by the mouth, more lately it has been administered hypodermically or as an intra-pulmonary injection. Reports all speak more or less favourably of its action in phthisis, and note its effect in lowering the temperature. It is now one of the recognised drugs used in the treatment of phthisis, being largely employed at the Consumptive Hospital, Ventnor, and the new hospital in Co. Wicklow. Few, however, have used it in any but phthisical cases.

In an interesting paper by Dr. Sinclair Coghill, of the Consumptive Hospital, Isle of Wight, in the *British Medical Journal*, March 7th, 1896, p. 586, I was struck by the very uniform and marked reduction of temperature which the charts and recorded cases there showed, and I determined to try whether this was a regular feature of its action or only part of the general improvement in phthisical cases. It seemed, however, a very serious drawback, that the drug was given in these cases hypodermically. However, in the

* Korrespondentzblatt für Schweitzer Aertze. No. 2. 1887.

British Medical Journal, August 31st, 1895, I found that Rondot, at the French Congress of International Medicine at Bordeaux, had drawn attention to its power of reducing temperature when applied to the skin with oil. Bard, of Lyons, at the same Congress referred to its external use, but says it may be dangerous—(1) by the sudden fall of temperature which immediately follows its use; (2) by the nervous depression produced by repeated applications, and that, therefore, it should not be employed in such conditions as enteric fever on account of the long duration of the disease, but that in erysipelas and pneumonia it is very useful. We, however, did not observe either of these bad results in our cases.

The method we have adopted is as follows:—Any part of the body may be selected, by preference the axilla or abdomen. The skin is washed and dried; 5 to 10 minims of the drug are then rubbed gently in with the finger over a circular area, about 3 or 4 inches in diameter; the part is covered with oiled silk to impede evaporation, and this is kept in place with a strip of plaster. Slight smarting is usually noticed during or immediately after application, but it soon passes off.

While on duty in Cork-street Hospital, in the early part of this year, I had a large number of cases to select from, especially as, through the kindness of my colleague, Dr. Ashe, I had the selection of his cases also. I thus had it used in a great number, and, what is more important, a great variety, of cases. A note has already been published on some of these cases by Dr. Bourke, Assistant Resident Physician in the Hospital, in the *Medical Press*, April 22, 1896, and I have to thank him for the valuable notes he has taken for me and the observations made.

Through the courtesy of my colleague, Dr. Cosgrave, I have had the opportunity of obtaining further observations at Cork-street Hospital.

Altogether I have used it in over fifty different cases of very various febrile conditions, and from the age of 2½ years upwards.

It would be impossible here to enumerate all these cases and show the results obtained, but I will summarise as fairly as I can, and give examples of actual cases treated, leaving you to draw your own conclusions from these so far as it is possible.

Summary.

I.—In no case did we notice any ill-effect following its use, with one possible exception. This was the case of a young woman with enteric fever. The temperature having a high range of 103·4° in the evening, guaiacol was used on five successive evenings. On the fifth it fell 3·5°; she fell asleep, but early in the morning showed symptoms of collapse, from which she was with some difficulty aroused. I mention this case though the collapse did not appear for several hours after the temperature had fallen, and after the patient had slept. This question of ill-effect I place first, as if the use of the drug is practically free from danger we are justified in giving it a full and fair trial.

II.—It very rarely fails to cause a fall of temperature, the amount of reduction varying with the intensity of the fever, being greater when the temperature is high than when it is only moderate in degree. In one case it seemed to fail; this however was a case of phthisis with very moderate pyrexia, the evening temperature rarely exceeding 100°.

III.—The fall of temperature reaches its maximum generally about one hour after the administration of the drug. The effect is not usually transient in the ordinary sense, the reduction being, on the whole, maintained till the next evening rise, and this does not often reach the level of the previous evening.

IV.—After its use the skin becomes moist, and the patient nearly always falls into a quiet sleep. Whether this is due to the drug or is a consequence of the fall of temperature I am unable to say, but I incline to the latter as an explanation. Many patients, particularly these suffering from phthisis, feel its good effect in this particular, and request its repetition if it has been stopped.

V.—Given in the way I have indicated it does not seem to have any effect on the course of the disease, which is the cause of the fever. I have no experience of its effects when given by the mouth or hypodermically.

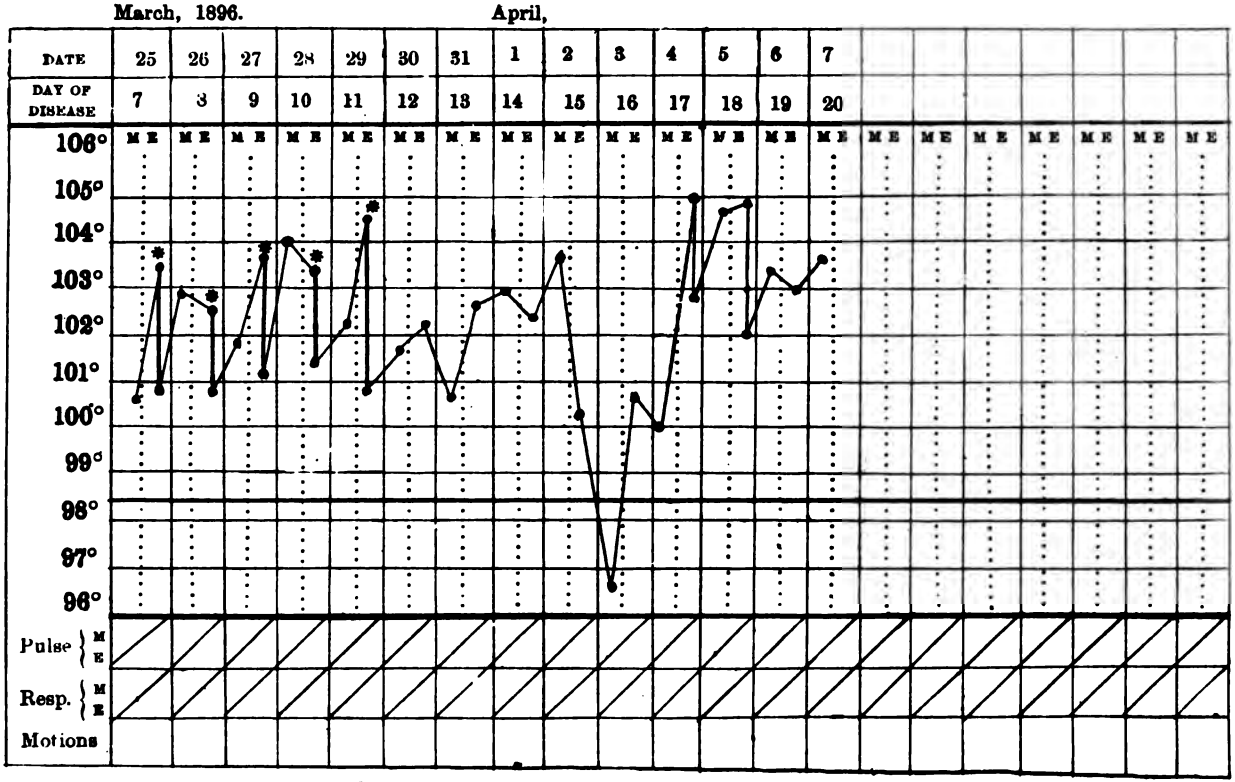
VI.—It seems to act on pyrexia no matter what the disease may be which causes it, and where other recognised means of reducing temperature have already failed.

VII.—Finally, it usually causes an increase in the secretion of urine, diminishes the night sweats of phthisis, and often relieves greatly the hacking cough. Cardiac failure is the only condition that I would consider should contra-indicate its use.

As to amount employed, three to five minims for children, and five to fifteen minims (usually ten minims) for adults is what we have used. It has been recommended to use it mixed with oil, but we have found that when thus used its effect is neither so rapid nor so marked as when employed plain. It is quite probable that a much larger quantity than fifteen minims would be perfectly safe and produce greater effects, but we have been satisfied with the effect obtained from the moderate and hitherto safe quantity of ten minims. Martindale says that one to two minims may be given internally, and Dr. Smith, in the article before quoted, says seven to eight minims may be given in pill. At Cork-street however ten minims have been given by the mouth thrice daily in phthisical cases without the slightest ill effect. If thus given internally the best vehicle is some rectified tincture—*e.g.*, tinct. gentian co.—but it may also be given in cod-liver oil.

TEMPERATURE CHART

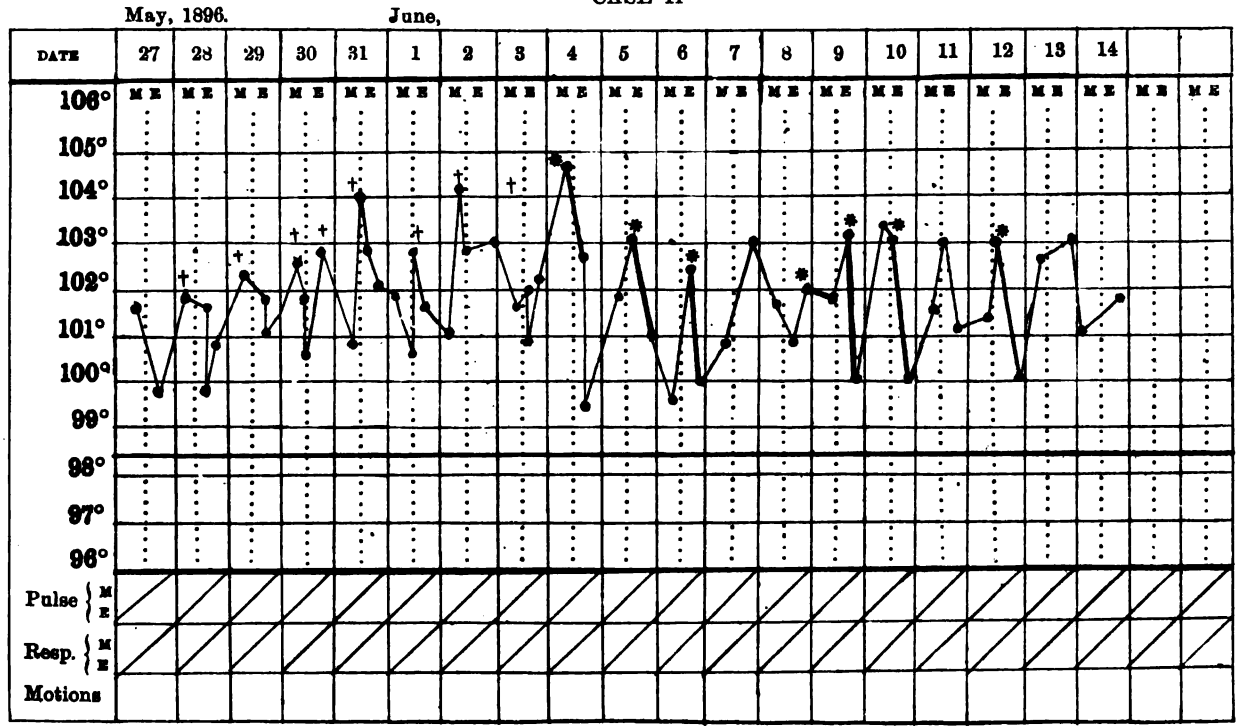
CASE I



* Guaiacol, 10 minims; average reduction = 2·5° one hour after.

TEMPERATURE CHART

CASE II



† Ice cloths; reduction = 0·9° one hour after.
* Guaiacol, 5 mins. „ = 1·9° „

In referring now to individual cases, I will confine myself as far as possible to the consideration of the temperature alone.

Case I.—A. C., female, aged twenty-five, admitted 25th March, 1896, in seventh day of enteric fever. On the night of the same day the temperature was 103·5°. Guaiacol, 10 minims, ordered to be rubbed into the axilla. In one hour the temperature had fallen 2·6° F. The guaiacol was continued for five successive nights, giving an average reduction of 2·5°.

The case was a very severe one from the first, the heart being noted as very feeble at the outset, though the pulse rate was not excessive. On the fifth night of guaiacol treatment the temperature fell from 104·4° to 100·8°, the skin became moist, and she slept, but towards morning appeared very weak and became collapsed. Remedies were applied and she rallied. When the morning temperature was taken, in ordinary course, it was 101·6°. No more guaiacol was used. Four days later (sixteenth of illness) she had very profuse melæna, after which the temperature rose to 105°. In a couple of days she became comatose, and died on the morning of the twentieth day of her illness.

As I said before, I cannot consider that the collapse here was due to guaiacol, seeing that, though the patient had a weak heart all through, nothing untoward happened after the four previous administrations, and collapse only came on several hours after the fifth dose.

Not having much experience of the drug at this time we did not use it again in her case, though the temperature rose over 105°.

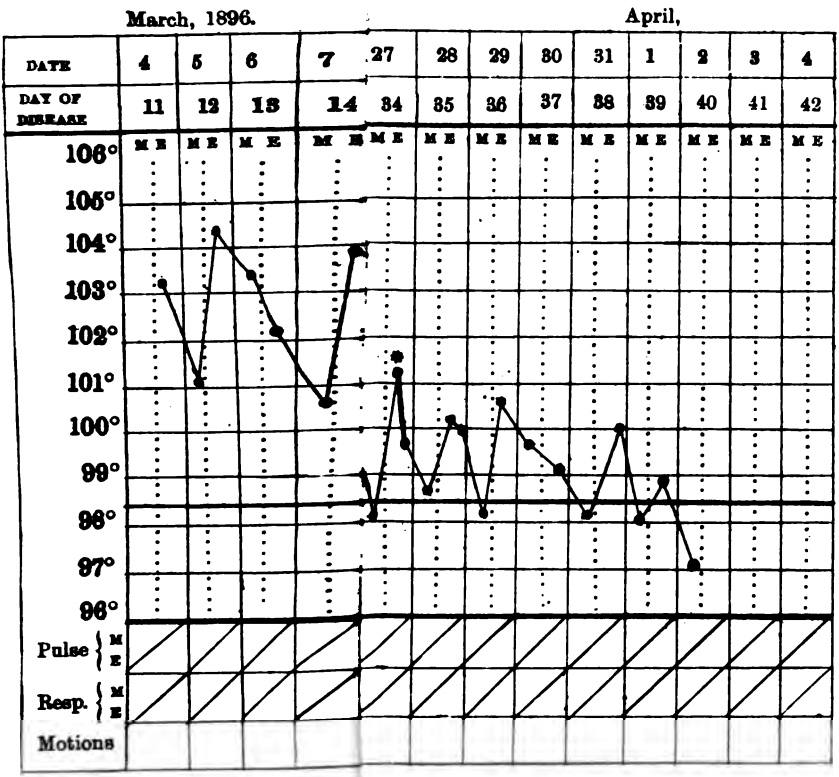
Case II.—A. N., female, aged sixteen, admitted May 18th, 1896; catarrhal pneumonia; six weeks ill (query—phthisis in addition, but no bacilli found). After ten days in hospital, with the temperature ranging from 100° to 104°, ice cloths were ordered in the morning, when the temperature was highest, and a three-hourly chart taken. After six daily applications of the ice cloths the average reduction of temperature in three hours was 1°. Guaiacol was now ordered epidermically. After eight daily applications the average reduction in three hours was 2·4°; further,

the rise was postponed each day till it became an evening one. She improved greatly. The guaiacol was stopped, and we were able to send her to a convalescent home, June 29th, five weeks after admission.

Case III.—M. M., female, aged twenty, admitted March 4th, 1896, the eleventh day of enteric fever. A very severe case; bad diarrhœa, congestion of both lungs, high evening temperature, ranging about 104° for several days. Sponging had little or no effect on the temperature. On the twentieth day, her temperature being 104·2° at mid-day, ice cloths were applied for twenty minutes. One hour after, this had reduced the temperature only 0·8°. At 5 p.m., 5 minims of guaiacol were used, the temperature being 103·4°, and at 6 o'clock the temperature had fallen to 101·4°. It did not rise again till next evening, when at 5 o'clock it was 104°. Guaiacol again applied caused a fall of 2°, to 102°. On fifteen successive evenings, with two exceptions, 5 minims of guaiacol were rubbed in, and the average fall of temperature for that period was 1·9°, the reduction being on some occasions as much as 4°. After this the temperature gradually settled down, and she left the hospital well. It should be noted that this patient was so weak, with severe enteric, complicated with bad bronchopneumonia, that only 5 minims of guaiacol were used each day.

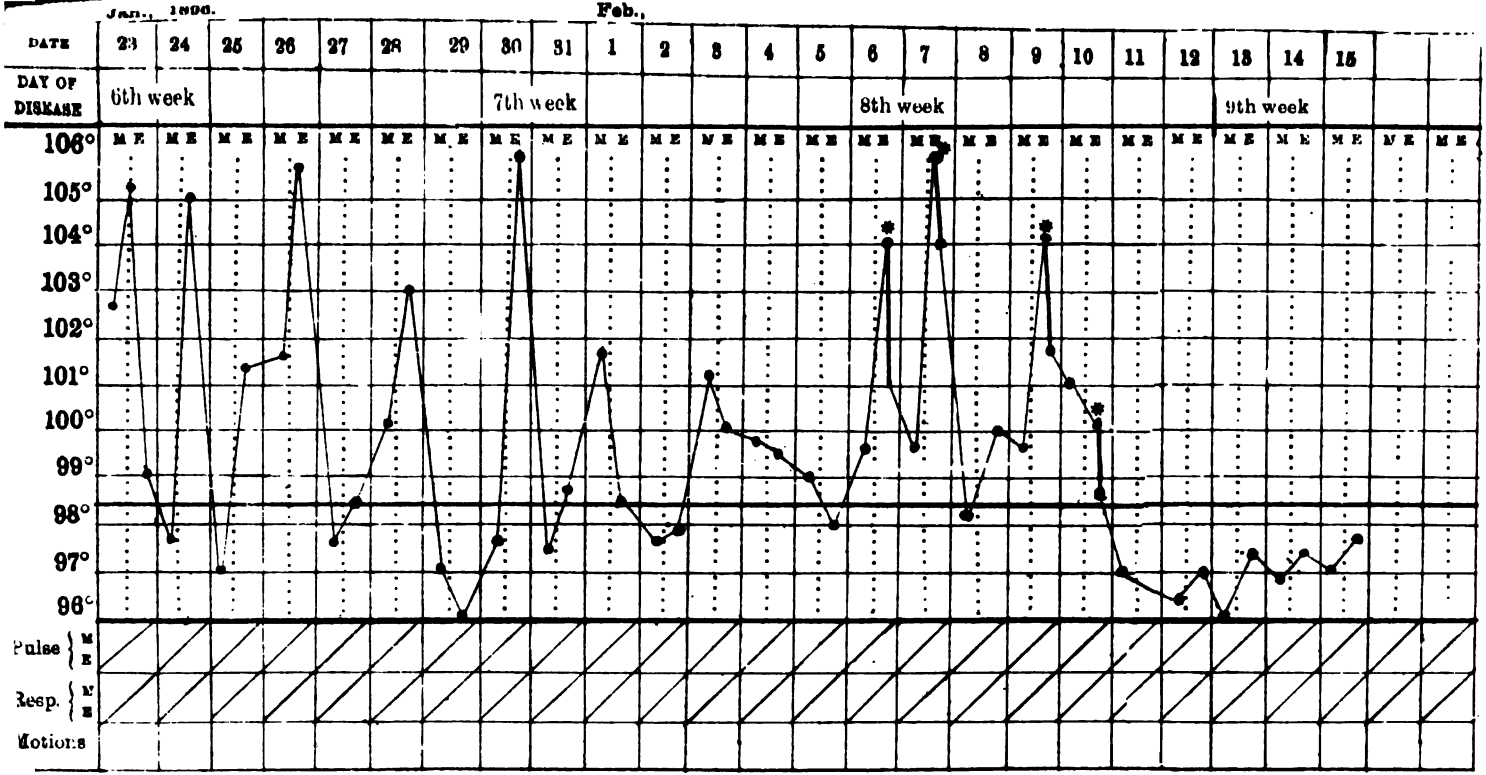
Case IV.—M. R., female, aged twenty-six, admitted 27th December, 1895, with puerperal fever, on the eleventh day after delivery. For six weeks the case ran on with a temperature of pyæmic type, varying from subnormal to 106°. When it reached a high point 5 grains of quinine were given and she was sponged. Sometimes the temperature fell after this, sometimes it did not. On 6th February, 10 minims of guaiacol were ordered; after each application the temperature fell in one hour from 2° to 3°. On the 10th February it only reached 100·2°; on 11th February—*i.e.*, six days after the first application of the drug—the temperature was subnormal and remained down, with some inconsiderable variation, till she left hospital on March 1st, twenty-five days after the guaiacol treatment was commenced, and nine weeks after admission to hospital.

Case V.—T. C., male, aged seventeen, admitted July 13th, 1896, with rheumatic fever, being already five days ill. His heart was weak, but there was no murmur, and temperature 99°. In the


March, 1896.
April,
DATE
4 5 6 7 27 28 29 30 31 1 2 3 4
DAY OF DISEASE
11 12 13 14 34 35 36 37 38 39 40 41 42
M E
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
96°
Pulse M E
Resp. M E
Motions

TEMPERATURE CHART

CASE IV

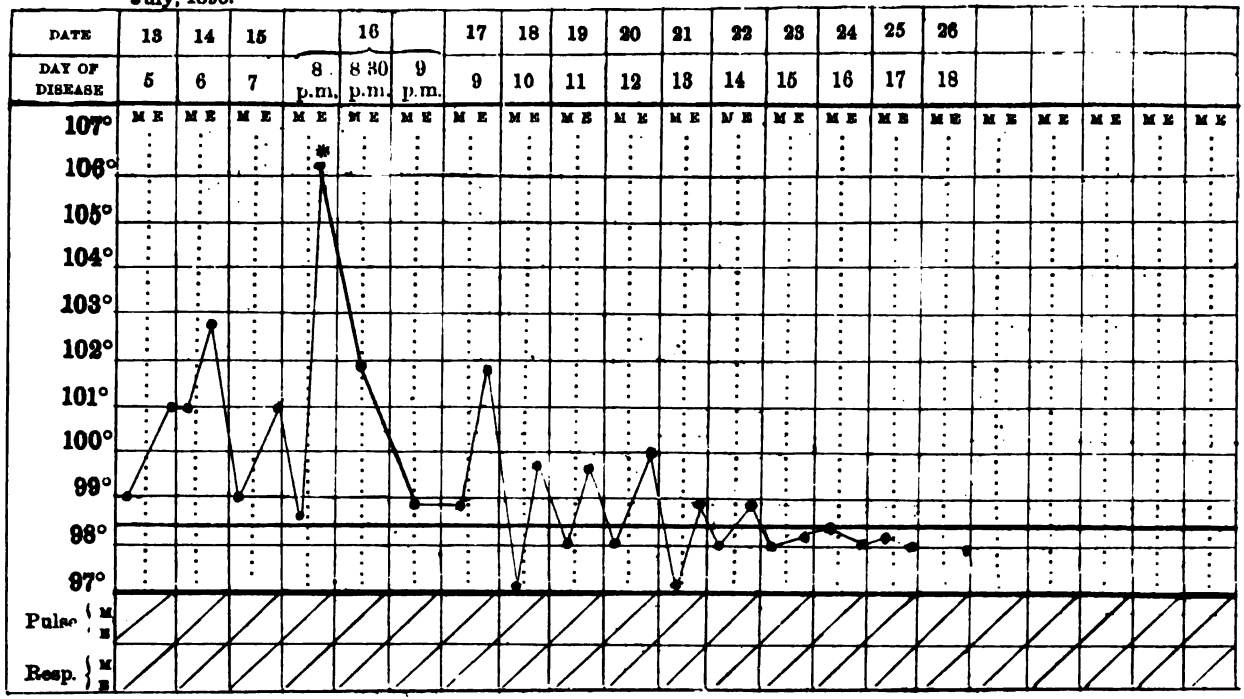


* Guaiacol, showing fall of temperature in one hour.

TEMPERATURE CHART

CASE V.

July, 1896.



* Guaiacol, 15 minims, at 8 p.m., temperature = 106·2°.
8 30 p.m., ,, = 101·8°.
9 p.m., ,, = 98·8°.

evening, 101°; next evening, 102·6°; and on the third evening, 101°. On the fourth evening after admission the patient became anxious and restless, but ceased to complain of pain. The temperature at 7 50 p.m. was 106°; at 8 o'clock, 106·2°. He was now a little delirious, the skin dry and hot, face pale, lips cyanosed. Guaiacol, 15 minims, were immediately applied to the abdomen in the usual way; at 8 30, half an hour after, the temperature had fallen 4·4°, to 101·8, and at 9 o'clock to 98·8°. The next morning it was at the same point, and though in the evening it rose to 101·8° it settled at normal four days after—*i.e.*, eleven days after admission—and he left hospital twenty days after admission.

Though when admitted this patient's heart was so weak that it was thought right to order him digitalis, yet this sudden fall of temperature from 106·2° to 98·8° in one hour, or 7·4°, caused no collapse or other unpleasant symptom. He very shortly fell asleep, the skin becoming moist and cool.

I have only this one case of true hyperpyrexia to bring forward for they are fortunately rare; but having found by experiments that guaiacol does, in nearly every case, reduce temperature, having brought before you several striking examples, and when I remind you that, as a rule, the higher the temperature the greater the result, I think we may fairly conclude that guaiacol was the cause of the fall in this case. The absence of untoward symptoms may have been due to the promptness with which the remedy was used, for the rapidity of heart failure in hyperpyrexia is so great that in this case, with an already feeble heart, any delay would in itself have been serious. The ease, the rapidity, the absence of fuss and disturbance of the patient which this simple remedy presents, compared, for instance, with the cold bath, seems almost too good to be true. It will be remembered that, as the case seemed desperate, 15 minims of guaiacol were used instead of the usual ten minims.

Case VI.—*Variola.*—M. M., male, aged twenty-one, admitted 20th March, 1896. It will appear strange to bring forward a case of small-pox treated with guaiacol, but I consider it very valuable, as

we know the usual course of the temperature at the period the guaiacol was used, and can, therefore, more fairly judge its effect. The patient was admitted convalescent but desquamating from scarlet fever, which, by the way, makes persons unusually susceptible to small-pox. He had a mitral systolic murmur. In a few days he became suddenly very ill, and was found with a temperature of 108°. Nothing could be made out as a cause, and when I saw him the same morning, I was quite at a loss to account for his illness. At 9 o'clock in the evening the temperature was 104°, and pulse 120. Guaiacol, ten minims, then given, and at 9 45 the temperature had fallen to 101·2°, and two hours after to 100°, the skin at the same time becoming moist. Next morning, the second of his illness, the temperature was 104·6°; he was sponged, but it did not affect the temperature; at 1 p.m. temperature was found to be 105·2°, and at 2 o'clock 105·4°. Ten minims of guaiacol were now given, and in half an hour the temperature was reduced 1°—viz., 104·4°; at 4 o'clock, 104·2°. At 5 o'clock it had risen 0·2°, to 104·4°, so ice cloths were applied for twenty minutes without any good effect, for at 6 o'clock it was 104·8°; after this it began to fall—viz., 7 o'clock, 103·6°; 8 o'clock, 102°; and next morning it was well down with a copious small-pox eruption out on his face.

The case turned out a very severe one of semi-confluent variola, but made a good recovery.

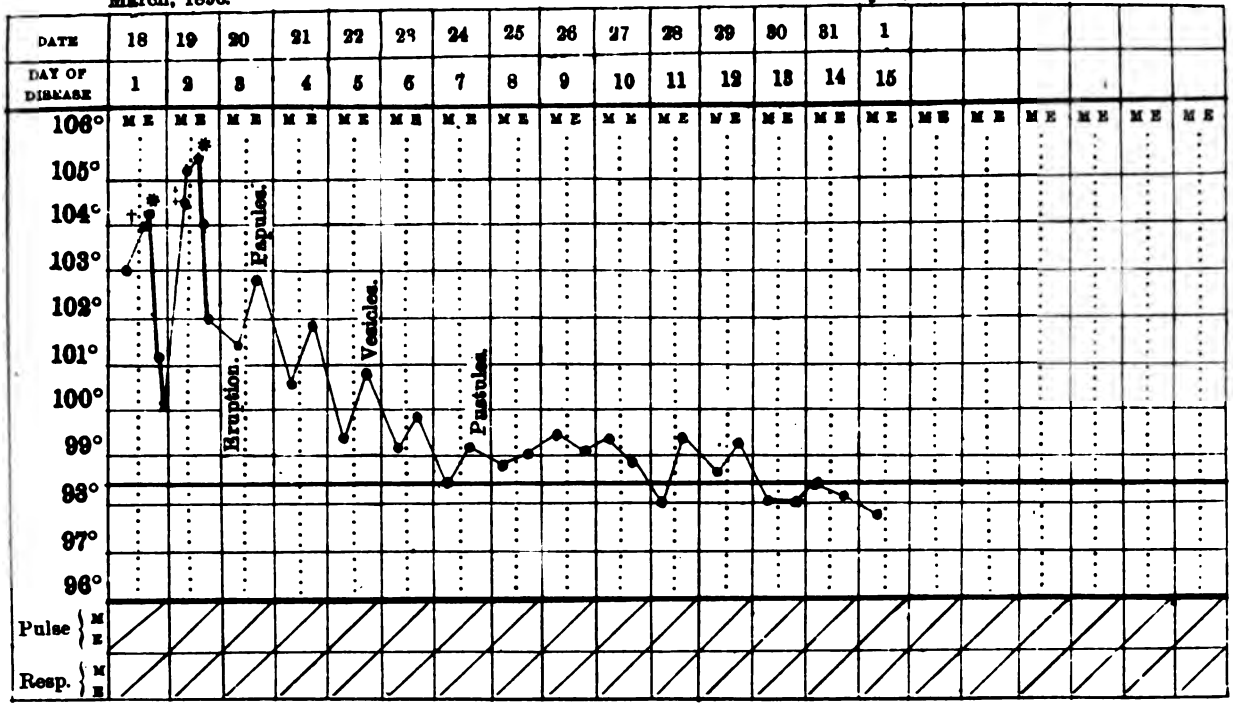
In a sharp case we know the temperature usually runs up quickly and retains its high level, between 103° and 105°, till the eruption appears; but in this instance guaiacol apparently dragged it down 4° on the evening of the first day, and during the second day, while it was on the rise, brought it down certainly 1° and possibly 3°.

Though a cardiac murmur was present no weakness was caused by the drug.

Case VII.—*Semi-malignant Scarlet Fever.*—M. M., aged seven, admitted August 15, 1896, on third day of illness. He was wildly delirious, with temperature 105°, the throat greatly swollen and stopped up, rash very profuse on abdomen and legs, and of a dark purple colour. Dr. Day, who is an exceedingly keen observer,

TEMPERATURE CHART

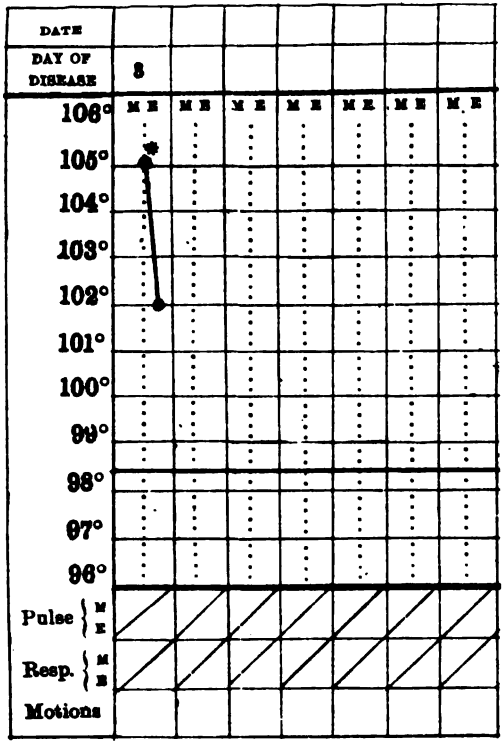
CASE VI.



* Guaiacol, 10 minims; result one hour after.
† Sponged; result one hour after.
‡ Ice cloths.

TEMPERATURE CHART

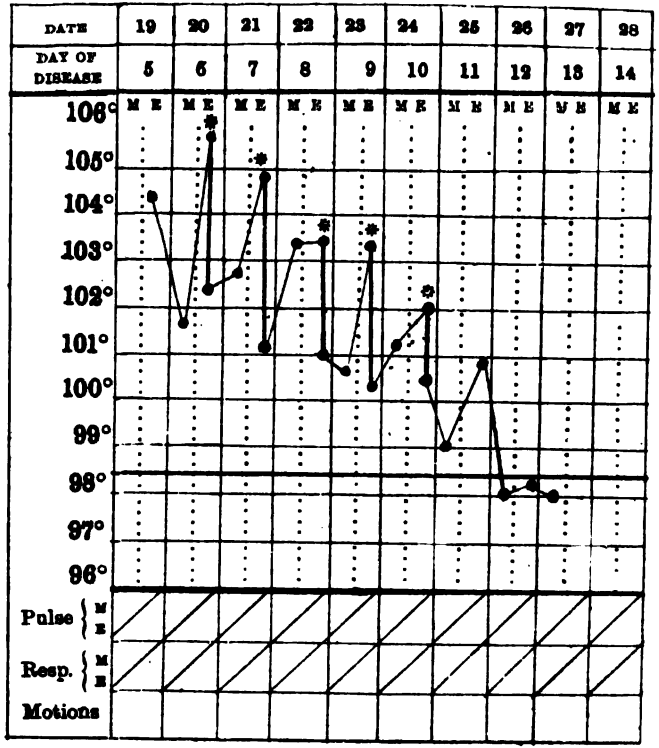
CASE VII.



* Guaiacol; result one hour after.

TEMPERATURE CHART

Oct., 1906. CASE VIII.



* Guaiacol, 10 minims; average reduction, 2·8°.

and has very great experience, considered the case hopeless. Five grains of quinine given by the rectum, and repeated in one hour, had no effect on the temperature, which was still going up. Guaiacol, 8 minims, then applied. An hour after the temperature had fallen 3°, the delirium ceased, and he fell asleep. The temperature did not rise again till the next day, when it reached a moderate level. The patient made a satisfactory recovery. In cases of exactly similar nature ice cloths have been used with only a slight and very transient effect, hyperpyrexia soon terminating the case fatally.

Case VIII.—A severe case of facial erysipelas, with great delirium for the first week, which would have rendered sponging impossible, as he was a powerful brewery man. The average reduction of temperature one hour after five morning applications of ten minims of guaiacol was 2·8°.

On Friday, October 9th, 1896, in another case of erysipelas, with temperature 105°, guaiacol reduced the temperature to 102° in one hour, and in another to 101°. Next evening it was not used, temperature only reaching 103°.

Case IX.—H. C., case of enteric fever, aged twenty-five (October 14th, 1896), shows the result of sponging on two successive nights with half-hourly observations, where either no effect was produced, or else an actual rise occurred followed by a fall to the original level; whereas guaiacol under same conditions on two succeeding nights gave a considerable and immediate fall equal to over 2° in one hour.

Dr. Bourke, at my request, took the rectal temperature in several cases and found that it usually rose after sponging, and fell after guaiacol.

I wish it to be clearly understood that I do not advocate the use of guaiacol as a routine treatment in cases of fever. Fever being but a symptom, interference with it should only be attempted when the symptom itself becomes dangerous. When that dangerous point is reached we may feel by no means too well armed; therefore, the real object of this paper

is to try to induce others to put the drug to test and see for themselves its effects.

In most of the cases above cited it was not used as part of the treatment, but merely for purposes of observation in a number of cases of widely different nature, where every means were at hand to note the effect and combat any untoward symptoms which might arise.

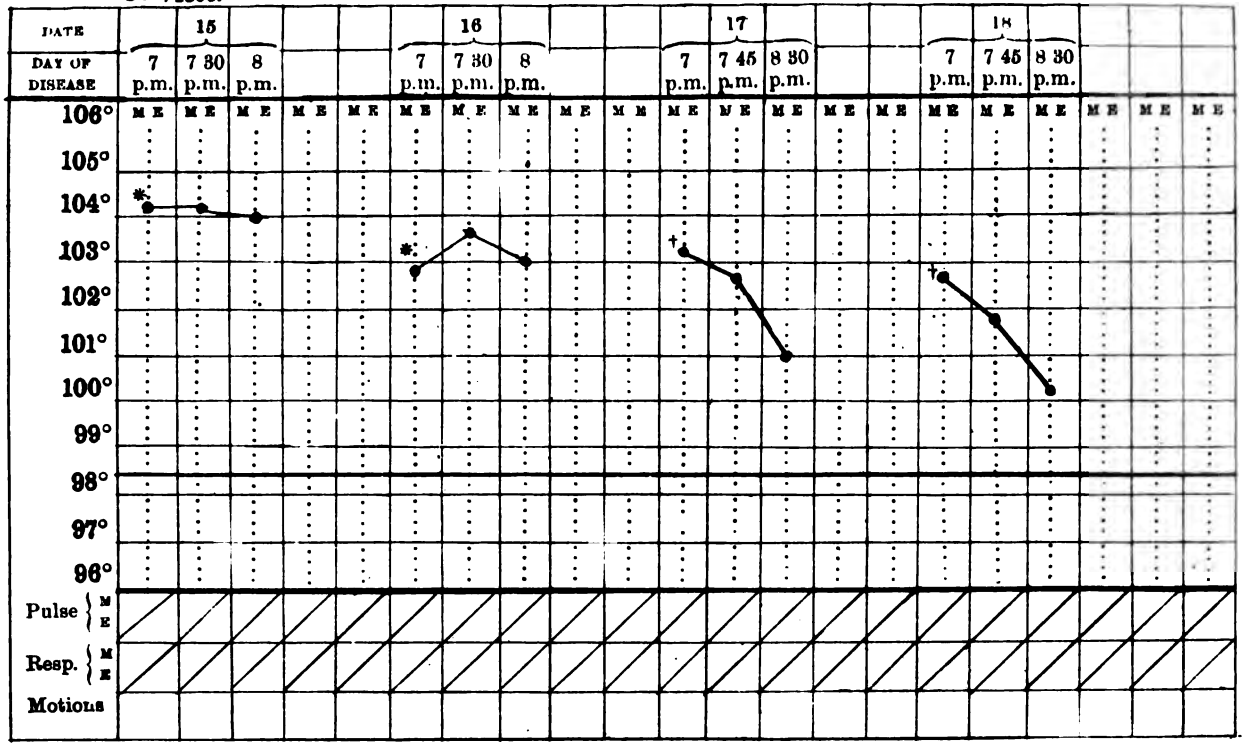
Dr. Craig referred to charts of three enteric patients in which the drug had been used on occasions when the temperature became high; a marked fall followed in each case, and that without any injurious effects. He stated that it seemed to him that the drug acted by producing perspiration, and that it was the evaporation that caused the reduction of temperature. Until they knew more, however, about the temperature centres of the spinal cord they could not come to a certain conclusion on this point.

Dr. John W. Moore said that if Dr. Craig's explanation of the action of the drug were correct they could not look forward with confidence to its effect as a reducer of hyperpyrexia in acute rheumatism. He (Dr. Moore) would enter an emphatic protest against indiscriminate attempts to reduce temperature, especially in typhoid fever. The more he saw of typhoid the more satisfied he was that reduction of temperature in that disease was, *per se*, by no means the *summum bonum*. He had long since given up the use of phenazone or antipyrin, phenacetin, and acetanilide as reducers of temperature in typhoid fever. They were useful for relieving headache and some other symptoms of the disease; but their use as reducers of temperature was positively dangerous, and he saw no reason why guaiacol, used either epidermically or endermically, should differ very much in its action from that of those drugs. The effects of the drug in pulmonary consumption were altogether different from its operation in the other cases. Its effects when given internally in pulmonary consumption were not so immediate and extreme as when it was used epidermically, and rather depended upon its antiseptic properties and its power of reducing the septicæmic conditions of that disease.

Dr. O'Carroll said he had used guaiacol in phthisis, and only hypodermically, with the result of always reducing temperature, and without collapse. He performed the hypodermic application

TEMPERATURE CHART

CASE IX.



* Sponging.

† Guaiacol, 8 minims.

because they could measure the drug more accurately than in the case of the endermic method. In his cases the temperature never fell below the normal, or a little above the normal point. In one case of phthisis, a young girl came into the Whitworth three times in a state of hectic, improved under guaiacol, put up a few pounds of flesh, and went out in a fortnight. The case, however, was very far from being cured, and was only improved to the extent of a slight diminution in the crepitation and the amount of expectoration. It was not given in cases of the earlier catarrhal signs, because there was no urgency.

Dr. Walter Smith said the results put forward by Dr. Drury were very singular, and might excite incredulity, if not astonishment. The statement that a few minims of this drug rubbed into the skin could reduce temperature within an hour implied two things—viz., that the drug was absorbed, and that it produced a remarkable effect on the interior tissues of the body. He would confine his remarks to the pharmacology of guaiacol. The fact that it was capable of free administration in the ways described proved that it was comparatively non-irritant; and yet it was closely related to the phenols and other members of the carbolic acid group. How then did it come about that, whilst they dare not rub the poisonous carbolic acid into the surface, they could do so with guaiacol, which was the chief representative of the creasote group, and find it comparatively harmless? For a number of years creasote and carbolic acid were confounded by chemists. It was now known that carbolic acid was a phenol. It was equally well known that guaiacol was a methyl derivative of one of the phenols. This raised the question—How far was physiological action related to chemical constitution? Speaking generally, it may be stated the introduction of OH (hydroxyl) into any of the complex organic group of the aromatic series increased the poisonous powers of the compound, while the introduction of a methyl molecule seemed to have the opposite effect—viz., a tendency to mitigate its toxicity.

The President said the outcome of the discussion seemed to be that they had got a drug which was not only very useful but also very dangerous. Dr. John W. Moore had said that reduction of temperature was not a *summum bonum* in enteric fever. Perhaps what he meant was that it was not advisable in enteric fever to reduce temperature by depressing drugs. He (the President) had reduced temperature with guaiacol in one or two cases with good effect. In one case of enteric fever, the patient's temperature being

at 105·4°, fifteen minims of guaiacol were rubbed into his axilla, and in half an hour he was in a state of profound collapse, his temperature having fallen to 96°; he became almost pulseless; and it was only by the administration of stimulants and the application of warmth that he was rallied. He need not say that in that case the drug was not used again. Perhaps the dose was too large. But it should be noted that in that case the patient had a weak heart. It had been said that the drug acted by producing perspiration. But it had also been stated that it was a powerful vaso-motor constrictor. If that were so, its action might be mechanical. It was also an anæsthetic, and had been frequently used for the relief of pleuritic and neuralgic pains. The hypodermic injection of guaiacol had been followed by most alarming collapse.

DR. DRURY replied.

micturition; pus and albumen in the urine." At first the patient was treated for rheumatism, after that for syphilis. Dr. Barton called the eruption "rupia." At this time I had no doubt that the skin eruption was a psoriasiform syphilide. Dr. Barton was positive on the matter, and treated the patient with green iodide of mercury and quinine. In a few months she got quite well. She was admitted into the hospital again on May 7th, 1895. Mr. Geoffrey Hungerford kept a record of her case for me. She stated that three years ago an eruption broke out again which was not treated; it lasted two months and subsided spontaneously. Five months before her admission in May, 1895, she was attacked with severe pains in her limbs, which lasted for about three months, when they were followed by the eruption. For a day or so after admission to hospital her body was very copiously covered (though not universally) with scales, in patches resembling psoriasis. About the ankles there were some moist patches. On May 19th—*i.e.*, twelve days after admission—the eruption had become quite general, the generalisation being ushered in by an erysipelatous condition of the face with much swelling and fever. The appearance was typical of pityriasis rubra—universal redness and exfoliating epidermis.[a] The note I made was: "Universal redness, pink or somewhat salmon tint; not much infiltration; redness replaced by yellow on pressure. Universal scaling in the form of large flakes in most places; on the face the skin looks tightened and scales are small; heaped up scales on the scalp. Many of the nails are thickened, rough, and discoloured; the normal nail is present on one or two fingers, but is being loosened and lifted off by hypertrophy of the nail-bed beneath." In the light of my previous diagnosis in 1887, I regarded the case as one of psoriasiform syphilis terminating in pityriasis rubra. On May 25th a change had taken place in the condition of the body—the desquamation had lessened, brown crusts were present in places, the result of serous oozing, which, together with suppuration, was occurring in places. There was marked tenderness; the mere taking off of the dressings caused bleeding. On June 2nd she was in a woeful state; much emaciated. The legs and thighs were universally reddened, in parts superficially ulcerated—ulceration forming figured patches, leaving islets and irregular tracts of non-ulcerated skin between. The ulceration was well-marked at

[a] See illustration from photograph taken by Professor J. Alfred Scott.

the lateral surfaces of the knees. The groins were superficially ulcerated, also the external genitalia. Front of thorax and abdomen were in a like condition—*i.e.*, superficial ulceration with non-ulceration of skin between, forming a kind of pattern. The fore part of the neck was ulcerated—some purulent oozing from the superficial ulcerations. The back of the trunk was similarly affected; also the upper extremities, which readily bled. The face had improved. The surface was dry and there was no swelling. This fact is to be noted—that the scaling had entirely disappeared, and the unbroken portions of skin appeared, except for some redness, practically healthy. The patient died on June 3rd.

As to treatment—I tried green iodide of mercury with opium, and boric acid ointment externally. I also tried thyroid gland capsules.

Post-Mortem Notes.

External appearances.—The skin all over the trunk ulcerated in a network pattern. The same condition was present to a lesser extent on the upper and lower extremities. The inner aspect of the thighs and knees and the space over Scarpa's triangle on both sides were particularly affected. The ulceration was superficial in most places, the dermis being exposed, and in some places ulcerated through. The skin in parts was showing signs of healing.

Heart, pleura, peritoneum, and spleen.—Normal.

Lungs.—Emphysematous.

Liver.—Abnormally pale. Weight, 60 ounces.

Stomach.—Interior congested.

Intestines.—Duodenum and greater part of jejunum and ileum congested internally.

Kidneys.—Fatty.

The course of events in this patient's case was:—First, rheumatoid pains in limbs, followed after some weeks by an eruption, which resembled psoriasis in appearance, but which rapidly became general. For some days this generalised eruption presented the typical features of pityriasis rubra, and was ushered in, as has been noticed in some cases, by an erysipelas-like attack of the face. Soon the scaling ceased, and tracts of superficial ulceration occurred over the body,

leaving portions of skin unaffected, which portions having lost their scaliness appeared practically normal.

It is perhaps open to question whether the eruption which was present in 1887 was a syphilitic eruption at all. At the time I had no doubt in my own mind that it was a syphilide, and Dr. Barton, who was a high authority in the diagnosis of syphilis was positive in the matter; still the disease, as I well remember, responded slowly to treatment, and recurred twice since that time, and on the first recurrence disappeared spontaneously—add to this her history was not syphilitic. I think it is best to place it alongside of the cases called pityriasis rubra, as during a period of its course it presented the typical features of the affection described under this name. The eruption at the commencement no doubt bore some resemblance to psoriasis—note also the rheumatic pains which frequently accompany psoriasis; and one might ask was it a case of generalised psoriasis; but, when general, there was little or no infiltration, and its termination was utterly unlike psoriasis.

I examined sections of skin taken from a partially ulcerated surface; these sections comprised both an ulcerated and not ulcerated part.

The ulceration was very superficial, only involving the very surface of the corium. At the edge and in the floor of the ulcer there was a considerable inflammatory cellular exudation, and dilated vessels were seen. Adjoining the ulcer the interpapillary processes were much elongated. There appeared to be some evidence of inflammation round the sweat-coils. The granules of the granular layer did not appear as abundant as they should be (according to Professor J. Alfred Scott). Some of the cells of the granular layer were without granules.

Case III.—James M., came under my care in the Adelaide Hospital on August 21st, 1894. On the 12th July preceding there was some swelling in the groins. His legs and feet were swollen; in

the popliteal region there was a watery exudation. For some time before these symptoms occurred he was affected with a scaly state of the scalp. The swelling in the legs disappeared after about three days, and was followed by redness and scaliness of the skin. He next noticed the skin of the arms becoming red and scaly, and from that it spread over the body generally. When he came into hospital there was an enormous amount of desquamation from the whole surface of the body; the surface was universally reddened, and left a yellow coloration on pressure. There was some moisture in the popliteal space, but otherwise the skin was dry. The palms of the hands escaped. The skin of the face had a tightened, drawn appearance, and the lower eyelids were everted. The scalp was thickly beset with scales. The diagnosis I made at the time was: "A case of almost universal seborrhœic eczema presenting the characters of pityriasis rubra." He improved rapidly under treatment, and left the hospital on October 6th, 1894, well, except for some scaling on scalp and eyebrows. There were no serious constitutional symptoms.

In June of this year (1896) he came again under my care with a relapse of the condition. After some weeks he got very much better and returned home. A relapse again occurred, the issue of which I have not heard.

Case IV.—E. F., aged forty-nine, married, was admitted into the Adelaide Hospital on July 1st last. My friend, Dr. George Scriven, under whose care she had been from time to time for some years, sent her to me. She had been subject to typical attacks of psoriasis, Dr. Scriven informed me, for some years, which yielded to arsenical treatment. No history of syphilis. About five weeks before admission to the hospital she noticed on her abdomen a number of small swellings or blisters which spread; when scratched a clear, watery fluid exuded. The eruption next appeared on the inner aspect of the thighs, then on the arms and elsewhere. When I first saw her she was in a pitiable condition—almost universal dermatitis. The trunk was universally covered, except a small tract near the breasts. The eruption had begun as vesicles in groups, and then fluid effusion travelled along in the epidermis. No distinct bullæ were produced, but that the mode of spreading was by fluid infiltration of the epidermis was proved by looking to the borders of the eruption near the wrists. The hands were almost completely spared, but at the

base of the palmar aspect of the hands, near the wrist, one observed the epidermis loosened by fluid within it, forming a raised border of loosened horny layer. The back was universally reddened and moist. The upper extremities and part of the trunk were copiously covered with yellowish serous crusts, and the surface was mostly moist. In part the surface had a parchment-like feel as though the horny layer was stiffened, and about to be again loosened by exudation beneath. The eyelids, upper lip, and chin were affected. The rest of the face was free from eruption.

As time went on the horny layer of the palms became loosened by a gradual spreading forwards of the border above described. Finally, the entire hands became affected, and the nails separated. The surface became drier and drier, the horny layer became detached in paper-like scales, and in a short time the condition was in most parts like pityriasis rubra. The patient is still in the hospital; there is still universal dermatitis, exfoliation of the epidermis of the front of the trunk, arms and legs. The back has all along been free from scales, but has been universally reddened and slightly moist. As the scales separate the horny layer again stiffens, becomes wrinkled, and cracks, and so the process of exfoliation goes on. If one rubs off the stiffened horny layer before it separates, the surface beneath is slightly moist.

The constitutional symptoms have been great prostration, frequent pulse, fever, and at times abdominal pain and discomfort. The odour from the patient's body has been at times very offensive. Various remedies have been tried, but hitherto without any very decided benefit. Eucalyptus ointment has proved the most satisfactory local remedy.

Much controversy has arisen on the nature of pityriasis rubra. Dr. E. Buchanan Baxter, in an exhaustive article on the subject, reported in the *British Medical Journal*, 1879, divides cases of pityriasis rubra, or, as he prefers to call it, general exfoliative dermatitis, into four groups—(1.) Cases of primary exfoliative dermatitis. (2.) Exfoliative dermatitis supervening on eczematous affections. (3.) Exfoliative dermatitis supervening on psoriasis. (4.) Exfoliative der-

matitis supervening on pemphigus. He considers that "the general exfoliative dermatitis which occurs as a primary disease is substantially identical with that which occasionally breaks out in the course of certain more familiar cutaneous affections." He puts forward the view, as Dr. Pye Smith puts it, "that it is a common meeting point of four diseases curable by arsenic whenever they become universal," and it serves to show the close relation which subsists between these four diseases—namely, eczema, psoriasis, lichen ruber, and pemphigus..

Crocker is guarded in his opinion on the nature of pityriasis rubra. He writes—"It may be primary or follow some other form of dermatitis, be acute, chronic, or relapsing; but the general aspect of the skin varies but little under the different circumstances. Some authors are inclined to regard it as a form of eczema, but the majority of cases are much more like a very acute psoriasis, and it is better, at all events for the present, to consider it as a separate affection."

In two of my cases eczema preceded the occurrence of pityriasis rubra. In the fatal case which I have described the initial lesions were more like psoriasis, but I cannot say they were sufficiently typical to justify me at the time in making a positive diagnosis before the eruption became general. Indeed, as stated above, I diagnosed originally psoriasiform syphilis. The symptoms in my fourth case, who had been affected in the past with psoriasis, began with bullæ, and I am inclined to regard this case as pemphigus foliaceus terminating in pityriasis rubra. Some observers refuse to accept Dr. Baxter's hypothesis, and base their argument on the fact that in some cases pityriasis rubra is not preceded by any of these eruptions, and that when an eczema or psoriasis becomes general there are usually some marks of their origin preserved. It is clear that if one maintains this

view, one must base the diagnosis of pityriasis rubra not only on clinical appearances, but on history—an unsatisfactory ground for diagnosis. As Dr. Baxter puts it—"The diagnosis would be retrospective, based on the history of the antecedent eruption, and in that alone, in the vast majority of cases." One would be obliged to exclude all cases of pityriasis rubra presenting the clinical features and constitutional symptoms of the condition if they were preceded by an eczema, psoriasis, &c. Dr. Pye Smith, in a paper published in "Guy's Hospital Reports," 1880-81, gives an excellent account of the disease up to that date, and while he argues for a substantive disease, as distinct from eczema, pemphigus, &c., he admits that "The difficulties in forming a judgment on the several questions raised are extreme. Every fresh case which I have myself met with, or which has been recorded by others, has added some fresh obstacle to making satisfactory generalisations."

I would prefer to base the diagnosis of pityriasis rubra on the clinical appearances, and defer forming any conclusion as to its nature until some specific pathological or bacterial cause is discovered which can stamp it as a disease *sui generis*. The term dermatitis exfoliativa, based on the clinical features, is certainly a more accurate one, but as the term pityriasis rubra was originally given by Devergie, who first described the condition, I have adhered to it throughout this communication.

Dr. Finny said the disease was of comparative rarity. The colour of the skin was a remarkable feature in the disease; but the most striking thing about it was the large scales which appeared all over the body. In 1875 he had a patient who suffered from the disease in the City of Dublin Hospital. (He exhibited the product of one night's discharge of scales from that patient.) The patient was a woman who had been in bad health, and who suffered

from rheumatoid pains in her joints; and suddenly her whole body became of a bright red colour, and scales formed with great rapidity from the crown of her head to the soles of her feet; the skin under the scales was always dry, smooth, and free from cracks or fissures. Dr. Beatty's case, in which there was skin moisture, seemed to him to be a great deal more like one of eczema than of pityriasis rubra. Another case, not of so great severity as that to which he had just referred, came under his care a few years afterwards. It was that of a man of very intemperate habits, who was a chronic sufferer from psoriasis. He had albumen in the urine, and the cause of his death was alcoholism. The rise of temperature in some cases was very remarkable. In the case of the patient that died, the temperature was very high for several weeks before death. The ætiological connection between psoriasis and dermatitis exfoliativa was well illustrated by the specimens sent round. Was this disease, then, to be considered one of separate individuality, or was it part and parcel of three others—viz., eczema, psoriasis, and pemphigus? He thought they were justified in holding, with Dr. Beatty, that it was a separate disease, which might occur in any of the other three.

Dr. Walter Smith said he had not seen more than five or six cases of the disease; and he agreed with Dr. Beatty that it was premature at present to assign to it a definite nosological position. His own impression, formed from observation, was that they were entitled to recognise under the name "pityriasis rubra" a serious and generalised inflammation of the skin, which unfortunately sometimes ended in death, and the most common antecedents of which were eczema and a psoriatic state of the skin. Pemphigus and eczema were extremely common affections, and generally occupied the major part of the body; but they did not produce any serious impairment of health beyond interfering with the patient's comfort and sometimes his sleep at night. On the other hand, pityriasis rubra was a condition worthy of a special name, because it was attended with very serious constitutional symptoms, including emaciation and loss of appetite, and not unfrequently ended in death.

Dr. Travers Smith quoted the opinions of Kaposi, of Vienna, on the subject of this disease.

The President said the questions that appeared to have arisen in the discussion were—whether this disease was a distinct one, or secondary to other affections, and what was the pathological nature

of it. There were cases reported in which the disease appeared to have arisen from some injury to the skin—a wound or cut—and there were others in which its starting point appeared to have been acute general dermatitis. A large number of cases were of a distinctly rheumatic nature; and in some there were previous histories of gout and tuberculosis as having existed antecedently to the occurrence of dermatitis. It was frequently a sequel to eczema; and cases had been referred to in which persons who had been the subjects of general psoriasis suddenly—within the limits of two days—became affected with pityriasis rubra. As to the pathology of the disease, Professor Scott's observations would seem to show that it was an inflammatory disease. As to its ætiology, in a case which occurred some years ago in one of the London workhouses, and which was described by Dr. Saville, a coccus was found in the serum. In a great many other cases, however, no such organism had been detected. The peculiar severity of some of the constitutional symptoms which had been described, and the fatal termination of some of the cases, implied something very much more than mere local inflammation.

Dr. Wallace Beatty replied.

CONCURRENT SCARLATINA AND ENTERIC FEVER.

By E. MAC DOWEL COSGRAVE, M.D., F.R.C.P.;
Professor of Biology, Royal College of Surgeons, Ireland;
Physician to Cork-street Fever Hospital.

[Read in the Section of Medicine, December 18, 1896.]

ALTHOUGH many cases are on record of convalescents from enteric fever contracting scarlatina, and on the other hand of convalescents from scarlatina contracting enteric, true concurrence—that is, the incubation and pyrexial stages of the two diseases occurring simultaneously—is not common, and has only lately been recorded, and that in but few instances.

A convenient starting-point which sums up previous knowledge is a paper by Murchison,[a] who, writing in 1859, says that in ten years he saw only one case of scarlatina contracting enteric fever, and that supervened on the twenty-sixth day; he gives, however, some cases of scarlatina supervening in enteric, but goes on to say, "No cases have hitherto been published showing the possibility of these two diseases co-existing."

This extreme view he afterwards modified, and in his classic work on fevers[b] says, "In the London Fever Hospital, where it was the practice to treat all forms of fever in the same wards, it was not uncommon for a patient suffering from enteric fever to contract scarlet fever, and I have notes of eight cases in which the eruptions of the two diseases co-existed." Murchison gives notes of two of these cases; in one the scarlatina eruption came out late in enteric—probably in the third week; and in the other case it appeared

[a] British and Foreign Medico-Chirurgical Review. July, 1859. P. 159.
[b] The Continued Fevers of Great Britain. Ed. III. P. 586.

on the twenty-second day. On the other hand Murchison says,[a] "Scarlatina appears indeed to predispose to enteric fever."

The text-book accounts have not advanced further than this. Dr. John William Moore, in his excellent work on fevers,[b] merely mentions Murchison's eight cases, but without analysing them, and gives none of his own. Dr. Marcus Hartfield[c] alludes to cases of coincident scarlatina, small-pox, and measles reported by Vogel, but does not mention the co-existence of scarlatina and enteric.

Curiously enough other observers went off on an entirely different line. Dr. John Harley, writing in "Reynolds's System of Medicine,"[d] announced his theory that enteric fever and scarlatina were manifestations of the same poison; and in 1871 he read a paper at the Royal Medical and Chirurgical Society,[e] arguing, from the general inflammation of the lymphatic glands sometimes occurring in scarlatina, that "the pathological changes accompanying an ordinary attack of scarlatina include all those of the first stage of enteric fever, and that the transition from one disease to another is but a natural pathological sequence, readily determined by any cause which may increase the intestinal lesion." However, as the cases given showed the symptoms of fully-developed enteric on the thirty-second, *circa* thirty-fifth, fifty-eighth, forty-first, fifty-second, and thirty-second day of scarlatina, these seem to have been cases of enteric following scarlatina.

Dr. Bayard Holmes, in a paper on Secondary Mixed Infection in Typhoid Fever,[f] which was published in 1889, does not allude to scarlatina; and Dr. H. N. Joynt, in a paper on

[a] Loc. cit. P. 453.
[b] Eruptive and Continued Fevers. J. W. Moore, M.D. 1892.
[c] American Text-book of Diseases of Children. 1894. P. 155.
[d] Article on Enteric Fever.
[e] December 12th, 1871.
[f] Medical Press. January 16th, 1889. P. 54.

the Influence of One Fever on Another,[a] published in 1891, deals with the modifying influence of scarlatina on other zymotic diseases, and *vice versâ*, but does not give a single case of scarlatina and enteric co-existing or in sequence.

Dr. J. H. Sequeira in 1891 published two cases of enteric fever, complicated by scarlatina, treated at the North-West Fever Hospital in 1890.[b] One case was admitted into hospital with scarlatina on the tenth day of enteric, and the other developed the rash of scarlatina five days after rose spots had appeared. These were evidently cases of scarlatinal infection following enteric, the courses of the two diseases running partly together.

The first cases I have found recorded in which the incubation stages of scarlatina and enteric were concurrent, were recorded by S. A. E. Griffiths, L.R.C.P., in a paper on Scarlet Fever and Enteric Fever.[c] Four cases, all occurring in the same family, are given. The first, a boy, aged eleven, on the sixth day of scarlatina showed characteristic enteric symptoms. The second, a girl, aged thirteen, got scarlatina three weeks after her brother, and in twelve days enteric was developed. The third, a girl, aged three, got scarlatina some days after her sister; in eleven days enteric was developed. The fourth, a girl, aged seven, got scarlatina on the same day as the last; in eleven days enteric was recognised. In all there was free desquamation.

The next cases are recorded by Dr. Caiger in a paper[d] read at the Epidemiological Society, April 18th, 1894, on the Co-existence, or Close Succession, of Two or More Infectious Diseases in the Same Individual. He analysed the cases treated in Rockwell Fever Hospital in four years, and showed that there were 362 cases of infectious diseases running in

[a] Practitioner. 1891. Vol. II. P. 261.
[b] British Medical Journal. 1891. Vol. I. P. 849.
[c] Lancet. 1893. Vol. II. P. 1307.
[d] Lancet. 1894. Vol. I. P. 1137.

part their courses concurrently. In 200 of these the febrile stages actually coincided. There were two cases of scarlatina coincident with enteric. At the same meeting Dr. J. F. Payne showed a temperature chart of enteric fever with concurrent scarlatina.

The same year Dr. Edward Carmichael published a paper [a] on Co-existence of Infectious Diseases in the Same Individual. In it he reported the case of a lad, aged six, who got scarlatina, but although there was free desquamation the temperature did not fall, and enteric developed. The occurrence of both diseases was curiously proved by the lad infecting his sister with scarlatina and his father with enteric.

Before passing on to the cases that have come under my own notice I would like to mention the adventitious scarlatiniform rash sometimes seen in enteric. It is spoken of by Murchison. [b] Dr. John William Moore also described it in a paper read before the Academy in 1888, [c] and later in his work on fevers; [d] and Jenner gives some cases in which this red rash preceded the rose rash, and was mistaken for scarlatina. [e] Other examples could easily be cited, but I merely mention these references to show that the occurrence of a scarlatiniform rash during the earlier period of enteric is not sufficient to show concurrence of the two diseases, but other symptoms of scarlatina should be present, such as invasion, distribution of rash, appearance of throat and tongue, and well-marked desquamation.

The following five cases of concurrent scarlatina and enteric were observed in Cork-street Fever Hospital during 1895-96. For the careful notes I am indebted to the kindness of Dr. Ernest A. Bourke, our Assistant Resident Medical Officer.

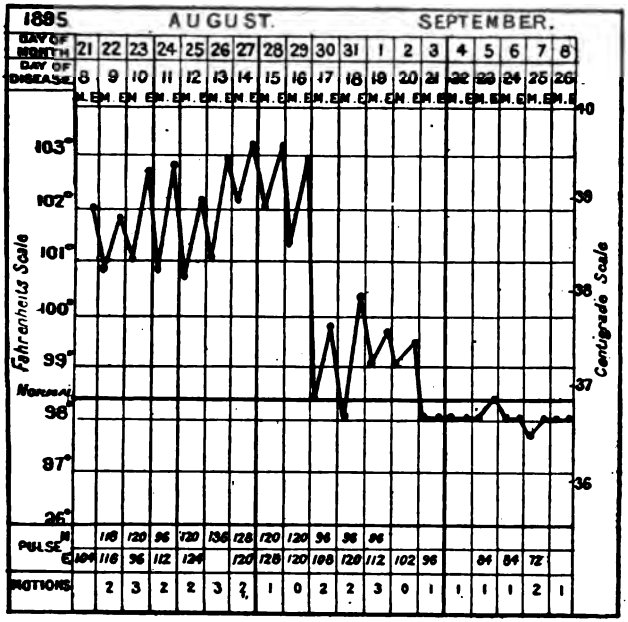
[a] Lancet. 1894. Vol. I. P. 1246.

[b] The Continued Fevers of Great Britain. Third Edition. P. 516.

[c] Accidental Rashes in Typhoid Fever. Transactions of the Royal Academy of Medicine in Ireland. 1889 Vol. VII. P. 10.

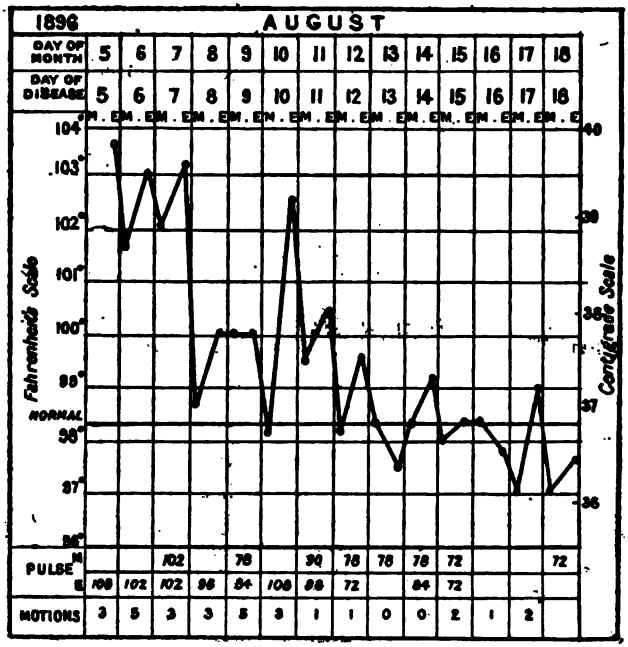
[d] Eruptive and Continued Fevers. 1892. P. 371.

[e] Fevers. 1893.



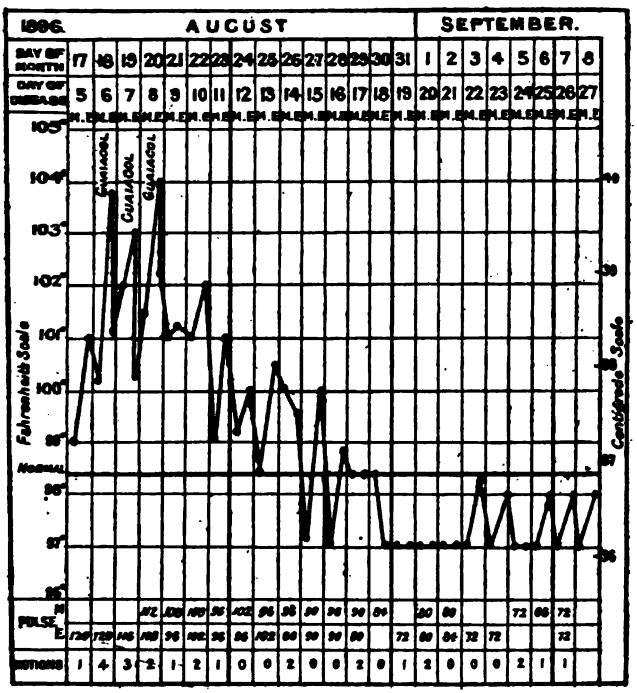
Case I.—E. A., a delicate, strumous-looking boy, aged eight and a half years, was admitted into Cork-street Hospital on August 21st, 1895. He had been attacked by scarlatina seven days previously, and was attended at home by Dr. W. J. Thompson, who, when thought safe to move, sent him into the hospital. On admission there was redness of the back of the throat, and enlarged cervical glands, but no trace of rash; there was also tympanites, enlarged spleen, diarrhœa with characteristic motions, coated tongue, and a temperature of 102°—in fact, all the symptoms of a fairly severe attack of enteric fever. Two days after admission free general desquamation set in. Five days after admission rose spots were noticed, but they might have been present two or three days earlier, as the desquamation would have concealed them. The patient made a very good recovery, the temperature becoming normal on September 3rd, and the lad was discharged from hospital on October 21st. The desquamation in this case was unusually free, and large flakes separated from the hands and feet. The sequel of the case may briefly be recorded. About a week or ten days after discharge from hospital he was suddenly

attacked by convulsions, and died in forty-eight hours, apparently from meningitis. There had not been at any time otorrhœa.



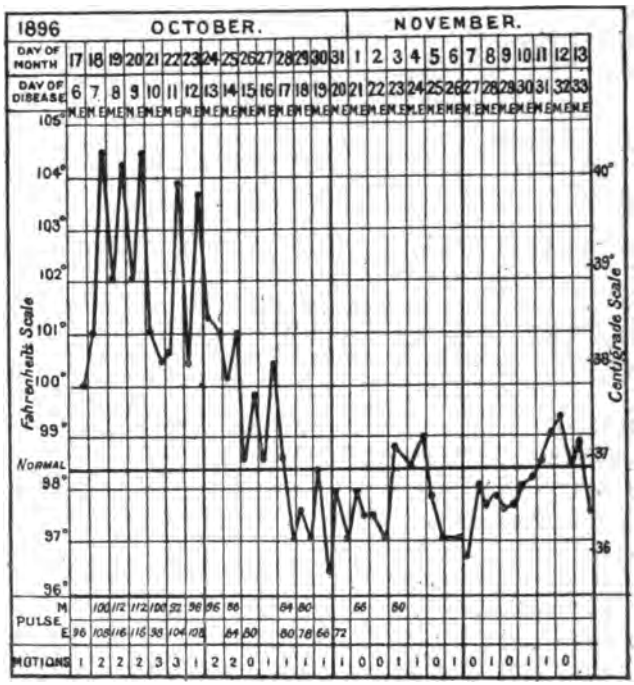
Case II.—S. K., a young woman aged eighteen years, was admitted into Cork-street Fever Hospital under my care on August 5th, 1896. Four days before admission she was attacked by sore throat and vomiting; a day or two afterwards a red rash was noticed on the body, and there was diarrhœa. On admittance there were traces of scarlatina rash, especially marked on the legs; the throat was red, the tonsils slightly swollen, and the papillæ of the tongue were enlarged; the patient complained of sleeplessness; the evening temperature was 103·8°. August 6th.—The abdomen was distended, there was considerable diarrhœa; salol, grs. x., ter in die, was ordered. The evening temperature was 103°. August 7th.—The diarrhœa still continued, the motions being light brown and liquid; there was tympanites, the spleen was enlarged, and the tongue was coated. August 10th.—On this the tenth day of illness rose spots were noticed on the abdomen,

tympany was increased, and the tongue was brown, dry, and transversely furrowed. By this time there was no doubt of the existence of enteric fever, and as the patient was freely desquamating all over, large flakes separating from the feet, the diagnosis of scarlatina was confirmed. From this on the case did well, the temperature gradually falling, so that on the fifteenth day of illness it was normal.



Case III.—G. H., a girl aged eleven, was admitted into Cork-street Fever Hospital under my care on August 17th, 1896. Six days previous to admission she complained of slight headache and pain in the stomach, and on the following day was attacked by pains in the limbs, sore throat, and vomiting, and felt so weak and so ill that she went to bed. For the two days previous to admission she had diarrhœa. On admission there was extensive scarlatina rash over the body; in some places it was commencing to fade; the tongue was thickly coated down the centre, the tip and

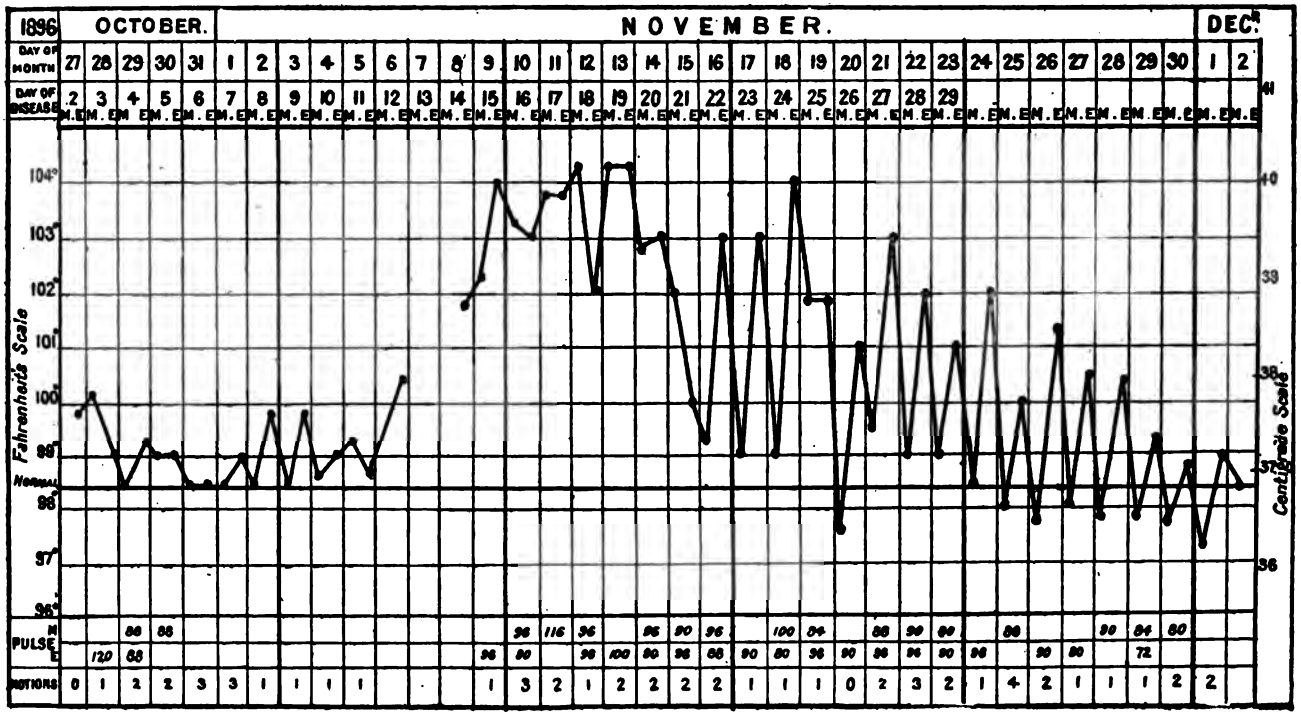
edges red, the papillæ enlarged. There were sordes on the teeth and lips; the tonsils and uvula were much swollen, dark in colour, and bearing exudation; the submaxillary glands were enlarged. The temperature on the evening of admission was 102°, the pulse 120. August 18th.—The rash was still more faded, but the evening temperature rose to 103·6°, and the patient was slightly delirious; the epidermic application of 7 minims of guaiacol brought down the temperature 2·0°. August 19th.—The diarrhœa continued, the motions being large, liquid, and light brown in colour. August 20th.—The abdomen was distended, there was tympanites, sordes on the lips and teeth, the tongue was dry and coated, the enlarged papillæ still showing; splenic dulness was increased, there was diarrhœa with light-brown liquid motions, the pupils were dilated, the patient was restless and inclined to be delirious. Towards evening the respirations became more rapid, there was slight congestion at the base of the lungs, and rose spots appeared. Next day fresh rose spots appeared, and there



was otorrhœa from the right ear; by this time desquamation was well marked. On this evening the temperature reached its highest point (104°), and was reduced by the application of 7 minims of guaiacol to 102·2°. From this on the enteric fever ran its usual course, except that the temperature became normal on the seventeenth day.

Case IV.—W. F., a lad aged ten, was admitted into Cork-street Fever Hospital on October 17th, 1896, under my care. Five days previous to admission he had sore throat, headache, and pain in the stomach, but no vomiting. He was sent in as suffering from scarlatina. On admission there was a fading rash, best marked on the legs; the throat was red, the tonsils enlarged, a small ulcer being on the left one; papillæ of the tongue were enlarged. On October 18th the tongue was coated, the face was pale, with a hectic flush on the cheeks, the eyes were bright, the pupils were dilated; the abdomen was distended and tender on pressure; there was slight diarrhœa, the motions being liquid and light yellowish-brown. On October 20th rose spots appeared over the abdomen and chest, and during the next three days fresh spots came out; during this period the abdominal symptoms became more pronounced. On October 28th—the seventeenth day of the illness—the temperature reached normal, and by November 9th there was free general desquamation over the body and limbs.

Case V.—R. K., a lad aged seven, was admitted into Cork-street Fever Hospital under my care on October 27th, 1896, on the second day of illness. He was suffering from scarlatina, and had a well-marked rash, swollen tonsils (the left being ulcerated), and the tongue had enlarged papillæ showing through a creamy coating. The scarlatina ran a mild course, and was free from any complications except slight diarrhœa. Ten days after admission the evening temperature rose to 100·4°, and two nights after to 104°. Gradually the symptoms of enteric fever developed, and the typical range of temperature, enlargement of the spleen, and moderate tympanites with diarrhœa continued throughout the further progress of the case. Red spots were not, however, noticed. There were no complications, and the temperature became normal on the thirty-fourth day—that is twenty-four days after the first symptoms of enteric. The desquamation was late but free, large flakes separating from the hands and feet.


1896
OCTOBER.
NOVEMBER.
DEC.
DAY OF MONTH
DAY OF DISEASE
Fahrenheit Scale
Centigrade Scale
104°
103°
102°
101°
100°
99°
Normal
98°
97°
96°
40
39
38
37
36
PULSE
M
E
MOTIONS

These cases form an interesting series; they all occurred within eighteen months, four being under treatment at the same time. All had well-marked enteric, and all had well-marked scarlatina, followed by free general desquamation. In four of these cases the incubation stages were concurrent, the scarlatinal infection being secondary to the enteric, so that in these four cases the invasions of the two diseases were almost simultaneous; the earlier prominent symptoms being those of scarlatina, the rose spots developing on the thirteenth, tenth, eighth, and ninth day respectively.

Another interesting point is that the scarlatina, instead of increasing the severity and danger of the enteric, rather seemed to abort it; all the attacks were fairly severe, the temperature on the first appearance of rose spots being, respectively, 102·8°, 102·6°, 104°, and 104·6°, and the temperature of the fifth case, in which no spots were observed, running up to 104·4°; and yet, in the first case, normal temperature was reached on the twenty-first day, the disease having been mild from the sixteenth day, and in the next three cases normal temperature was reached on the fifteenth, seventeenth, and seventeenth day respectively. In the last case the enteric fever ran slightly over three weeks.

The enteric also seems to have a mitigating effect on the scarlatina. This is especially shown in the third case, which was one of scarlatina anginosa; at any rate the co-existence of the two diseases does not seem to add to the danger of either.

The importance of recognising the possible concurrence of these two diseases is evident, and it should be remembered that the severe invasion of scarlatina may mask the enteric; so that if the temperature of scarlatina keeps up, and abdominal symptoms develop, the possibility of enteric being concurrent with the scarlatina should be borne in mind.

A CASE OF ENTERIC FEVER, WITH JAUNDICE AND HÆMATURIA; DEATH ON SIXTH DAY; NO INTESTINAL LESIONS, BUT ENLARGED MESENTERIC GLANDS AND SPLEEN; TYPHOID BACILLI FOUND IN THE SPLEEN.

By WALLACE BEATTY, M.D. Univ. Dubl.;
Fellow and Vice-President, Royal College of Physicians in Ireland;
Physician to the Adelaide Hospital.

[Read in the Section of Medicine, December 18, 1896.]

Case I.—Richard P., aged thirty-four, was admitted into the Adelaide Hospital on May 30, 1896. The history of his case was taken for me by Mr. Brownrigg. Up to May 26th the patient was in his usual health and spirits. On the morning of that day he went out to work at 8 30 a.m., but had to return home at 11 a.m. on account of sickness of stomach and pain in the back. He went to bed; did not eat anything all day; complained of thirst; drank a good deal of water, and took some stimulants. Bowels were moved, and urine was passed freely. There was no vomiting. He slept well the following night. On the next day, May 27th, he felt worse. His face was noticed to have a yellow tinge. He passed urine frequently, which was very dark in colour. He was still thirsty, and complained of pain in the back and abdomen. He slept badly during the night. On May 28th he was more jaundiced, appeared heavy, and was very thirsty. Pain in the abdomen and back was present during the day. Bowels were moved and dark-coloured urine passed frequently. He slept badly. May 29th.—He was still more deeply jaundiced; had pain as before; was very thirsty; complained of soreness of throat and had a slight cough; slept badly; sat up on the side of the bed occasionally during the night. May 30th.—At 6 30 a.m. he became unconscious; lips became blue. He vomited some green matter. During the attack there was no complaint of headache. On admission to the hospital the patient was in an unconscious state. He did not appear to be aware of anything that was going on. The pulse was weak. The skin was jaundiced. Urine was

very dark in colour, and contained much blood and casts. His temperature was 102·2° at the time of his admission. The knee reflexes were absent. Cutaneous plantar reflex was present. The patient resisted passive movements of arms and hands. He remained unconscious and died on the next day, May 31st, the sixth day of his illness.

The *post-mortem* examination was made by Prof. Alfred Scott. The heart was large—weighed 14 ounces. The lungs were normal; there were a few pleuritic adhesions on left side. In the abdomen were some old peritoneal adhesions. Round the liver were firm adhesions. The liver weighed 60 ounces; looked normal. No sign of obstruction in bile ducts. The kidneys were congested. The mesenteric glands were enlarged. The intestines were normal. Peyer's patches and the solitary glands were unaffected. The spleen was enlarged, soft, and friable, and weighed 15 ounces; there were old peritonitic adhesions round it. The gall-bladder was small and empty.

Professor Alfred Scott and Surgeon-Captain Fullerton cultivated typhoid bacilli from the spleen.

Such is the history of this remarkable case. To summarise it: Patient was well on the morning of the 26th May. In the forenoon of that day he became ill; pain in back and nausea. The next day he was jaundiced; the next day more jaundiced. On the morning of the 30th May he became unconscious. He was deeply jaundiced, and urine was bloody. On the 31st May, the sixth day of his illness, he died. The *post-mortem* examination revealed a large spleen and enlarged mesenteric glands. There was no involvement of the intestine, and no sign of obstruction in the bile ducts to account for the jaundice. Bacteriological examination revealed typhoid bacilli in the spleen.

Side by side with the above case I place the following one, in which the diagnosis of enteric fever was arrived at from the symptoms and the *post-mortem* examination; though, as a bacteriological examination was not made, absolute certainty is wanting:—

Case II.—Henry G., aged nineteen, was admitted into the Adelaide Hospital on September 30, 1896. He had a discharge from the left ear for five or six years, and had suffered from time to time pain in the ear.

On September 23rd he was attacked with pain at the left side of his head, and on the following night he had several rigors. There was no diarrhœa. The headache continued.

On September 30th, day of admission, he complained of giddiness and pain in the head, chiefly at the left side, and in his left ear. The tongue was dry and coated. The abdomen was rather retracted. He had some discharge from his left ear, and there was marked tenderness over the mastoid process.

In a day or so the pain in the ear lessened, and on October 6 it was noted that the discharge from the ear had ceased, and the tenderness over the mastoid was less. He had rigors. The pulse varied in frequency from 110 to 120. The urine was free from albumen. The temperature varied from 102° to 104°.

Between October 6th and October 10th he had several rigors; during the rigors the temperature rose to 104° or 105°; a pleuritic friction sound was audible at the right side. There was some pain in the side on inspiration. He also complained of pain in ear. His pulse increased in frequency for several hours before death; his heart was evidently failing; he became unconscious and remained so for 12 hours before he died.

The *post-mortem* examination was made by Professor Alfred Scott. The heart and pericardium were normal. There was a considerable amount of serous fluid and lymph in the right pleural cavity; this must have accumulated a few hours before death, as there was no percussion alteration a couple of days before. The bronchial tubes of the right side contained some mucus and pus, and through the lung were some small irregularly-shaped cavities lined with consistent white membrane and filled with chocolate-coloured fluid. The mesenteric glands were enlarged; the spleen was large and soft; the intestines were normal; the brain was carefully examined and found quite healthy.

During the patient's illness I considered that there were three possibilities—1. Cerebral abscess, in connection with the ear trouble. 2. Tubercular meningitis. 3. Enteric fever. The history of discharge from the left ear, the pain com-

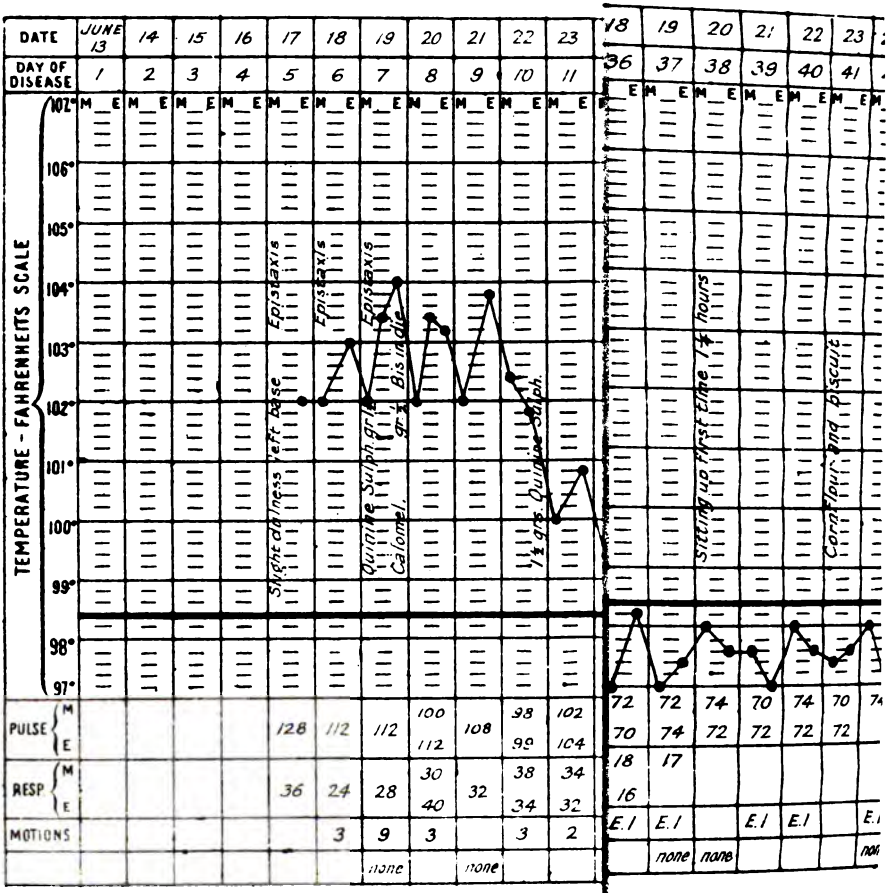
plained of for some days in the ear, and the frequent shiverings suggested abscess, but there was no irritative or paralytic localising phenomena, and the complaint of pain in the right ear shortly before death was against a left-sided lesion. In favour of tuberculosis were the headache and fever, while in favour of enteric were the early headache and the course of the fever; but as there were no paralytic symptoms such as occur before death in tubercular meningitis, on the one hand, and no diarrhœa or spots, or characteristically swollen abdomen, such as one would expect in typhoid fever, on the other, a positive diagnosis could not be made.

The result of the *post-mortem* examination showed that the only solution of his fatal illness was a blood poison, and from the enlarged mesenteric glands and spleen (such as occurred in my first case), I think we may strongly suspect the typhoid bacillus. The absence of abdominal distension is accounted for by the absence of intestinal lesions.

It is quite clear that without a bacteriological examination the diagnosis of enteric fever without intestinal lesions is impossible. One cannot therefore wonder that Murchison, in his truly magnificent work on Continued Fevers, should make the dogmatic statement that the specific lesions are invariably present. Every physician of experience has met with fatal cases of enteric fever in which surprisingly little intestinal ulceration has been found, and it is quite easy to conceive that if the typhoid poison can cause death by its action on the heart with only a few specific intestinal lesions present, it may also bring about death without producing intestinal lesions at all. That such an event may occur my first case proves. Dr. John William Moore, in his book on Eruptive and Continued Fevers, discusses the question which was raised some years ago by the late Dr. Hilton Fagge, as to whether there may not be some cases of enteric fever in

which no glands suffer at all, and he is disposed to answer this question in the affirmative. He relates a case brought by Dr. Vaillard before the Société des Hôpitaux de Paris, March, 1890:—"A soldier, after an attack of influenza, became very ill, suffering from stiffness in the neck, headache, coma, constipation; temperature 104° F. Death on the 10th day. At the autopsy were discovered hyperæmia of the meninges and lungs, and enlargement of the spleen, while the intestines were perfectly healthy. Cultivation experiments showed the presence of an organism, which appeared to be the bacillus of typhoid, in the spleen, lungs, and medulla. A streptococcus was also present. Dr. Moore also relates a case of what he believed to be spleno-typhoid, which occurred in his own practice in 1880. There was no involvement of the solitary or agminated glands, but the spleen was large, soft, and friable. He alludes to three other cases—one reported by Dr. Chantemesse at the meeting at which Vaillard described his case, and two reported by Dr. Sidney Phillips before the Clinical Society of London in 1891.

Both my cases died with symptoms of cardiac failure. Indeed, what experience I have had of enteric fever has led me to conclude that when the heart shows signs of failing in enteric fever, and when one cannot account for this by any accident, such as a severe intestinal hæmorrhage, the prognosis is extremely bad—indeed almost invariably fatal.


DATE
JUNE 13
14
15
16
17
18
19
20
21
22
23
18
19
20
21
22
23
DAY OF DISEASE
1
2
3
4
5
6
7
8
9
10
11
36
37
38
39
40
41
TEMPERATURE - FAHRENHEITS SCALE
102°
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
M E
Epistaxis
Epistaxis
Epistaxis
Slight dulness left base
Quinine Sulph. gr. 1
Calomel. gr. ½ Bis indie
1½ grs. Quinine Sulph.
Sitting up first time 1¼ hours
Cornflour and biscuit
PULSE M
E
128
112
112
100
112
108
98
99
102
104
72
70
72
74
74
72
70
72
74
72
70
72
RESP M
E
36
24
28
30
40
32
38
34
34
32
18
16
17
MOTIONS
3
9
3
3
2
E.1
E.1
E.1
E.1
E.1
none
none
none

A CLINICAL NOTE ON DESQUAMATION IN ENTERIC FEVER.

By NINIAN FALKINER, M.B. Univ. Dubl., F.R.C.P.

[Read in the Section of Medicine, December 18, 1896.]

On the 17th of June, 1896, I was asked by a lady to come and see her daughter N., a little girl about eleven years of age. I did not take long to make up my mind that she was suffering from enteric fever, and placed the day of my visit at the fifth day from the attack. I will not trouble you with the ordinary details of the case, the chart of which you can examine.

The temperature became normal on the fifteenth day of the disease, much to my gratification, as I had held out the hope of a fourteen-day fever, and it remained normal for the eight days, when it rose again to 100° in the evening, and a relapse of eight days ensued. The temperature became finally normal on the thirty-first day of the disease, and the child advanced rapidly towards normal health.

On visiting the child one day during the relapse I noticed a branny desquamation on the face, my attention being called to it by the mother of the child, and although I had not seen desquamation following enteric fever before, I remembered that in book research I had read of it, and proceeded to reassure the mother, by saying that it did occur sometimes. I may add that I did not myself feel at the time in the least degree anxious on the subject.

This observation was made towards the end of the fever. I was not visiting much then, but five days after I met a little sister of the patient, who told me that her mother said the skin was coming off the feet in flakes. I visited the

patient and found her peeling all over, the condition is well described by the words of Nurse Farley, who attended the case in a most excellent fashion :—"I first noticed the peeling after the relapse, on about the twenty-fifth day of fever. The peeling commenced on the chest and arms; then the face, legs, and feet—the feet were the worst, as the other parts were only scaly. It lasted for three weeks, until she was able to be up."

I got some of the scales, which were about the size of segments of a tape-worm, from the soles of the feet and toes, thinking that the science of bacteriology, which now overrides clinical medicine, might throw some light upon it, but I was not encouraged by the bacteriologists.

On the 19th of August I received a telegram from the same house, and on going out found baby aged about two years suffering from mild scarlatina. The parents would not believe me, and I only succeeded in carrying out isolation for three weeks. The peeling from this case was almost imperceptible and branny.

On the 13th September, the only holiday I had taken for thirteen months, I was again sent for. Being away that evening, another doctor arrived, who attended my first patient through a regular attack of scarlatina.

Dr. J. W. Moore, in his book on the "Eruptive and Continued Fevers," says—"Desquamation occurs in fine branny scales; the skin feels rough and perhaps dry; while the process is taking place the hair often falls out and atrophic markings appear on the nails."

Murchison, in his classical work on the "Continued Fevers of Great Britain, observes—"Desquamation of the cuticle on the cessation of the fever is chiefly observed in cases where sudamina have been present, but in many other cases the skin during convalescence is rough from the separation of the cuticle in minute branny scales. The hair often falls out, and

the nails may present markings similar to those which follow an attack of typhus."

Dr. Clifford Allbutt says—"Desquamation in fine branny scales is often observed towards the end of the fever, or during convalescence."

Weill, among 35 cases of enteric in infants noticed desquamation of the skin in 27. This desquamation involved the trunk, the limbs, the neck; but neither the face, nor the palms of the hand, nor the soles of the feet. The desquamation was sometimes mixed—furfuraceous upon the trunk, and in strips upon the limbs. It sometimes occurred at the end of the febrile period, sometimes after the decline of the fever, and sometimes late in convalescence. The author regards it as due to a nutritive disturbance of the skin. It was not preceded by erythema, and baths had no effect to prevent it.

WIDAL'S METHOD OF TYPHOID DIAGNOSIS.

[Section of Medicine, December 18, 1896.]

DR. MCWEENEY gave a demonstration of Widal's method of typhoid diagnosis. The apparatus he used was a Pasteur pipette, consisting of two wide parts separated by a very narrow one. The end intended for aspiration was plugged with cotton wool, and the other end was drawn out to a fine capillary point; and the whole pipette sterilised. He generally sterilised the finger of the patient from which the blood was to be drawn. The skin was prodded with a lancet needle, and the drawn out end of the pipette having been snapped with a sterilised forceps was introduced into the drop of blood. A sufficient amount to fill the tube was easily obtained by pressure and aspiration; and then both ends of the tube were fused and thus hermetically sealed. Conditions necessary for success in the diagnosis were, that the cultivations should be pure, typical and young. The most important characteristic was mobility of the bacilli; and when serum taken from a typhoid patient was added an almost instantaneous agglutination was seen through the microscope, large masses of bacilli becoming stuck together, in which the outlines of the individual bacilli were hardly distinguishable. In some cases all the bacilli appeared to be massed together. In other cases of equally undoubted typhoid type a considerable number of individual bacilli—even a large minority—remained pursuing their motions between the agglomerated masses. They seemed to be attracted by some force, as it were, to the massed collections. If the serum was not that of a typhoid patient, the bacilli were seen waggling about amongst the blood corpuscles; and a swaying movement of the latter could be seen,

occasioned by their contact with the bacilli. The blood of the typhoid patients agglutinated and paralysed the bacilli, and the blood of the non-typhoid patients did not. Dr. Johnson, of Montreal, adopted a different process in applying the test—viz., by taking the drop of blood on a sheet of sterilised paper, and afterwards dissolving the scrapings of the drop in water, which he then tested. It might be alleged that the blood of persons not suffering from typhoid might cause the bacilli to be agglomerated; but he had made the experiment with the blood of as many diseases as possible—scarlatina, pneumonia, before and after the crisis, synovitis, phthisis, and a number of other diseases—and had placed blood from them in contact with typhoid bacilli, and the typhoid bacilli exhibited no alteration in their mobility. It might also be objected that bacilli which were not typhoid might become agglutinated if mingled with the serum of a typhoid patient. But he had found that non-typhoid organisms having active mobility exhibited no alteration whatever in their movements when brought into contact with typhoid serum.

Joint discussion on Drs. Cosgrave, Beatty, Falkiner, and McWeeney's papers:—

Dr. Coleman said that he tested the blood of 11 typhoid patients on 20 different occasions, and in every case there was immediate "clumping" of the bacilli, with loss of mobility. In one case a few bacilli remained mobile for five minutes, though the clumping was very obvious. The age of the patients varied from 9 to 30 years, and the cases varied from mild to severe; whilst the dates of their illness included from the beginning of the second week to advanced convalescence. One patient gave the reaction when the temperature had been for 18 days normal. He tested the blood of 3 healthy persons; and also that of persons suffering from acute croupous pneumonia, rheumatic fever, gonorrhœal synovitis, measles, scarlatina, and phthisis, and in none of these cases did the bacilli lose their motion or become agglomerated. The method which he

adopted in the greater number of cases was to obtain a drop of blood from the patient's finger; to touch the blood with a clean coverglass; and then with a sterilised platinum loop to convey a few drops of the broth culture to the coverglass, to mix the blood and the culture on the coverglass with the platinum loop, and to examine immediately under a high power. In that way it was possible to examine 3 or 4 cases in a quarter of an hour in the hospital ward.

Dr. Dempsey said he had been concerned in the trial of this method in 18 cases. Of these 14 were presumably typhoid; and in 12 of them there was instant reaction, and agglutinisation rapidly followed.

Dr. John W. Moore said he remembered seeing, with Dr. Pollock, a case of enteric fever which suddenly developed scarlatiniform symptoms. When he first saw the patient he was covered from head to foot with a bright vivid scarlet rash. They concluded that he had not scarlatina, and that turned out to be so, the rash being only that scarlatiniform one which sometimes developed after three weeks of typhoid fever. Very often in cases of the kind, owing to the great determination to the skin, there was a destruction and a shedding of the cuticle, and a copious desquamation—he had seen it more than once in cases of typhoid. In the later stages of scarlatina he had seen certain papules developing on the skin which were exceedingly like the rose spots in typhoid; but the cases ran so short a course that the suggestion was that they were from beginning to end cases of scarlatina. He would ask Dr. Cosgrave did he try Ehrlich's test?

Dr. Drury said he saw one of Dr. Cosgrave's cases, and he had no doubt that it was enteric fever with concurrent scarlatina. The child had for some time well-marked enteric symptoms, and then undoubtedly the classical symptoms of scarlatina came on. The scarlatina symptoms subsided, leaving a medium degree of temperature for the rest of the fever, during which all the classical enteric symptoms remained.

Dr. Gunn said that twelve years ago Dr. Stannus Hughes, who was then physician to the Lord Lieutenant's household, sent to him (Dr. Gunn), at Steevens' Hospital, a stable boy of 16 or 17 years of age. Scarlatina was prevalent at the time, and the boy had very well marked symptoms of it—in fact, there was no possible doubt that it was a pretty severe case of scarlatina. The disease ran favourably; and then instead of convalescing in the usual way the

patient developed symptoms of enteric fever. These became pretty severe, and the case ran through as one of marked enteric fever. During the enteric period he desquamated freely; and there could be no doubt that he had the two diseases concurrently.

Dr. Day said it was not possible to deny that a patient could have two epidemic diseases at the same time. He remembered a case in which there was both typhus and typhoid; and another case of a girl who first had measles, which passed off; and she afterwards had a severe attack of typhoid with subsequent relapse. Some years ago he had a case of a lad who was sent to him from a hospital. He had thick desquamation after scarlatina, and through it could be seen the rash of typhus. He ran through a well-marked attack of spotted typhus. He had been treated in a ward where typhus fever was present. Another case was that of a girl who had been treated for scarlatina in Galway Union hospital. Before her skin had fully peeled off she came home to spend her convalescence at the Circular-road, and after three days was sent to his hospital with a maculated typhus rash upon her; and her skin continued to peel whilst she was running through the typhus course. He remembered another case of a child who had three diseases. First she had measles, and through the measles eruption could be seen a scarlatina rash, whilst her throat was covered with diphtheritic exudation. After all that had passed away she ran through an ordinary typhoid course. She got well; and came back two years afterwards amongst a batch of 30 girls from the same institution, suffering from scarlatina. They never thought she had scarlatina before. What she had first he did not know. As to Dr. Beatty's case, he did not see on what he based his diagnosis of typhoid fever. Leaving out bacteriological examination, he did not see how typhoid was practically to be diagnosticated save by the method of exclusion. As to peeling after typhoid, if the patient remained long enough in bed the skin would peel. He had a case of typhoid in which the man could not walk from the peeling of skin on his feet, and another of a child with tubercular disease whose skin was peeling.

Dr. Montgomery asked what was the earliest period in enteric fever in which Widal's method would give the characteristic reaction.

Dr. Boyd said that if Widal's method should continue to give as satisfactory results as it had done up to the present in typhoid cases it would prove a safe and satisfactory means of distinguishing

between typhoid and many affections that simulated it. In influenza epidemic cases the temperature sometimes continued up for days and weeks, and in cases which appeared to be mild typhus, Widal's method, if applied, would at once settle the question. Dr. McWeeney had tried the method in influenza cases, and no reaction had followed. In a case which Dr. McWeeney examined for him at the Mater Misericordiæ Hospital, and which was first regarded as a case of influenza, but in which the man had had typhoid two years before, the blood was taken after he had been four days ill and showed distinct agglomeration of the bacilli.

Dr. Bewley and Dr. Knott also made some observations.

Dr. McWeeney then replied. He believed it was a development of antitoxic material in the blood which caused the agglutination of the bacilli. The more virulent the typhoid cultures of bacilli were the less would be the degree of mobilisation and agglutinisation obtained with definite samples of typhoid serum. Hence it was not a question of absolute but of relative antitoxicity. Typhoid bacilli, it would be recollected, were not in the circulating medium, but were confined to the spleen and the mesenteric glands for the most part, so that any large quantity of antitoxin would not come to bear on them. As to Dr. Wallace Beatty's cases he would ask were the bacilli *Bacterium coli commune*, or were they proved to be typhoid bacilli?—because it was well known that after the death of the patient the *Bacterium coli commune* began to emigrate, especially in warm weather, from the bowel, and got into the spleen, liver, kidneys, and peritoneal exudation, and even into the heart, and presented such a strong resemblance to the typhoid bacillus that it was difficult to distinguish them. He did not question Dr. Beatty's diagnosis, but would like to know was that precaution taken?

Dr. Beatty said the bacilli in his case were typhoid beyond yea or nay.

Dr. Cosgrave also replied.

Dr. Falkiner, in reply, said desquamation did not usually result from lying in bed.

A CASE OF DIABETES INSIPIDUS.

JOHN J. BURGESS, F.R.C.S.

[Read in the Section of Medicine, January 29, 1896.]

In bringing under your notice a case of this disease, I do so with the reluctance of one who has nothing to add to our knowledge of its ætiology, or treatment, and merely strive to justify a short and unimportant paper, by submitting it in order to obtain the views of the Academy on a subject which has never been before this Section—of a comparatively rare morbid condition of which the pathology is undetermined, the prognosis unknown, and the treatment empirical.

Case.—J. B., aged fifteen; somewhat stunted in growth—four feet eight inches in height; weight 77 pounds; rather anæmic, with yellowish discoloration of skin, which is dry with tendency to desquamation; menses not appeared yet; has always enjoyed good health, except from the effect of a fall on the back of her head four years since; and a feverish sickness, called by her medical attendant gastric fever, some two years ago. The injury caused by the fall made her unconscious for a short time, but was otherwise unattended by cerebral symptoms. When she recovered from the fever two years since it was noticed she drank large quantities of cold water—in fact, was consumed by a ravenous thirst; when the parents refused her enough to satisfy her, on the ground it might do her harm, she would drink water out of basins that had been used for washing purposes, buttermilk, porter—in fact, any ordinary fluid, short of urine, she could have access to. She was, in addition, passing large quantities of the latter secretion, which flowed involuntarily when she was asleep.

She came first under my notice for a bronchial attack, when I found out the above condition, in addition to the chest trouble.

She had been getting thinner for some time, although her appetite was normal; had never suffered from scarlatina; her tongue and mouth were dry, with brown fur in the centre of former; bowels constipated; passed fourteen to sixteen pints of clear urine, and drank, according to her own statement, nine pints

of fluid daily. The circulatory signs were normal, and with the exception of, at the time, dry râles over her bronchial area, the lungs seemed healthy.

Her nervous system, if we except the polyuria and the asthmatic complication alluded to, presents nothing out of the common. She sleeps well. Her retina, examined by Mr. Montgomery, presented no morbid change. I am indebted to my friend, Professor McWeeney, for a report on the urine to confirm observations made by myself. It is acid, non-albuminous, watery; sp. gr. 1,003; contains abundant chlorides; urea diminished; total daily quantity examined, 14 pints; inosite absent. Her family history is not particularly good; her father and mother are alive and well. One brother has been under my care for aphonia, with ulceration of the glossal surface of his epiglottis, from which he recovered under treatment. She has three sisters, who if not in robust are in good health; on the other hand, two brothers died in infancy from convulsions, and one sister from caries of the spine. There is no history of epilepsy, insanity, or syphilis, on either father's or mother's side; the members of this family give me the impression that although at present not suffering from acquired or hereditary disease, they yet are possessed of what one might call a delicate constitution.

She presents neither the increased flow of saliva noticed by Külz, nor the excessive craving for food alluded to in Trousseau's cases.

The treatment adopted was, first of all, purgatives by reason of the constipation. Afterwards valerian, ergot, belladonna, nitric acid, and other remedies advocated by zealous believers in their efficiency, one after another, for a period extending over 18 months, without any permanent amelioration of the polyuria.

The one form of treatment which I found gave any improvement was the employment of an occasional dose of calomel, which appeared to diminish for some days the diuresis, thus agreeing with Golding Bird (in his article on the subject published in 1849), who claims success by the use of purgatives.

Before the discovery of sugar in the urine by Thomas Willis, 1670, all cases of excessive diuresis were included in

the common term diabetes; even afterwards, this sugarless form of polyuria was not noticed until the end of the 18th century, when Cullen made the division into true and false diabetes,

Robert Willis, in 1822, divided this disease into three forms, taking the amount of urea passed as his standard:—

1. When the urea was increased with the watery part—Azoturia.
2. When the urea was decreased below the normal amount for 24 hours—Anozoturia.
3. When the watery part was increased, the urea voided being normal in amount—Polyuria.

Vogel divided it into—

Hydruria—When the urea was normal or sub-normal with excessive urination.

Diabetes insipidus—When the urea was increased.

These distinctions have no longer a practical recognition, since urea may be increased or diminished by so many various factors—food, individual peculiarities, the washing out of the tissues with large quantities of imbibed fluid—that it would be unscientific to make of them different forms of the one disease, but rather to regard them as diurnal variations in the leading symptom. The age at which this disease appears is, according to the statistics of Roberts, Strauss, Van der Heijden, between 20 and 30, and the male sex more susceptible in the proportion of three to one of the female. That it is sometimes hereditary would seem to be proved by the statements of several observers, notably the cases mentioned by Weil of twenty examples of diabetes insipidus, from a total of 91 persons in 4 generations, and the family alluded to by Lacombe, where a mother, three sons, and a daughter, besides the mother's brother and his children, were affected. Hay has also frequently found it associated with family history of phthisis.

Its ætiology has been traced to—

1. Injuries of the skull.
2. Violent muscular efforts.
3. Violent emotions.
4. New formations in the brain.
5. Epilepsy.
6. Chronic diseases of the spinal cord.
7. Drinking cold water when heated.
8. The presence in the blood of a diuretic substance—Inosite.

The presence of the last was supposed to be pathognomonic of the disease; however, the minute quantity in the excretion, together with the experiments of Strauss and Külz, which showed it could be produced in health by getting persons to drink large quantities of fluid, negatived it as a specific sign, and merely due to the washing out of the tissues by the excessive water.

The diagnosis is from:

Interstitial nephritis.
Diabetes mellitus.
Amyloid kidney.
Pyelitis.
Hydronephrosis.
Hysteria.

In this case there was—(1) Neither sugar nor albumen present on the many occasions on which the urine was examined; (2) there was no wasting disease; (3) no pain or tumour; (4) the persistence of the symptoms and the age of the patient were against hysteria.

I am aware that most so-called cases of diabetes insipidus turn out on careful examination to belong to cirrhotic kidney, but I claim in this that ample time and repeated examination of the urine with the absence of the usual cardio-vascular phenomena entitle me to place this under the above heading beyond any possible doubt.

The pathology has been a difficult matter to determine, on account of the rarity of autopsies. The result of those obtained throw little light—some being negative, while a few point to the results of the physiological experiments of Bernard and Eckhardt, that lesions of the 4th ventricle or in the path of its afferent nerves produce polyuria.

Amongst the latter we find—

1. Tumour of the cerebellum.
2. Exostosis.
3. Tubercular disease.
4. Diseases of the sympathetic system (Eckhardt and Peyrane).
5. Diseases of the solar plexus (Dickinson).

Likewise carcinoma of the pineal gland (Minot).

Traumatisms of the hepatic region (Trousseau and Piorry).

The prognosis varies with different observers. Senator reports a case which lasted fifty years. In Weil's cases certain members of an infected family lived to 83, 74, 67, 76. Others have experience of cases which ceased abruptly after an intercurrent attack of one of the specific fevers. On the other hand, Neuffer reports a case which was fatal in four months from the inception of the polyuria.

The treatment, as one would expect from the uncertain nature of the disease, comprises innumerable drugs with a consensus of opinion in favour of valerian, ergot, and galvanisation of the neck. The conclusions to be arrived at seem to be—not from my own case solely, but on the authority of those who have made the literature of the subject—that the disease is purely functional, and has no destructive tendency on life; that it may be set up by injuries or diseases of the central nervous system, continuing after the acute effects of those have disappeared, in somewhat a similar manner to which pyrexia continues after the subsidence of

one of the specific fevers, and that treatment, in most cases, is useless, unless the cause be peripheral and under our control, as in the case recorded by Jacobi where the polyuria ceased after the expulsion of a Tænia medio-canellata.

The PRESIDENT said he believed Mr. Burgess' diagnosis of the case he had brought forward was quite correct. He (the President) had seen only one or two cases of the disease, which seemed generally to follow some debilitating illness. In Mr. Burgess' case he (the President) thought that what was called gastric fever was the more immediate antecedent of the disease. He would ask in what doses did Mr. Burgess give the valerian? Trousseau, who introduced the use of the drug, used to give very large doses of it—as much as 15 grains of the powdered root per day. A great number of drugs had been recommended for this disease; and according to some authorities antipyrin had been given with good effect.

DR. JAMES LITTLE expressed a hope that Mr. Burgess would let the Academy know of the result of the case. Diabetes insipidus was such a rare disease that some people doubted its existence; but Dr. Burgess had, in the case before them, so carefully eliminated the symptoms of every other possible disease that they must accept his diagnosis as correct. As to valerian, the old-fashioned way of giving it which he (Dr. Little) used to see was to prepare a good strong infusion of it, and give the patient a claretglassful of it in the morning. He used to direct the infusion to be made by putting an ounce of the root to a pint of water. He believed the use of valerian in many nervous affections was very decided.

DR. FALKNER said he did not see why an infusion made from the concentrated liquor should not be as good as one made from the fresh root. Assuming that the efficacy of valerian in diabetes insipidus depended on the presence of valerianic acid, was it wise to use an indefinite preparation like the infusion at all? He thought the preparation to be given should be valerianate of soda, or of quinine, or of zinc. As far as he understood the pathology of this disease he thought the only rational treatment of it was that by ergot. In ordinary diabetes it was stated by Lauder Brunton that the vessels of the liver were very much enlarged, and such an enlargement might take place where an injury occurred to the head, causing reflex dilatation of the vessels. A contraction of the vessels would

be caused by ergot. Another treatment was by the hydrobromate of arsenic. He was aware of a case of diabetes insipidus which had lasted for 26 years.

Dr. Parsons said he had seen only two or three cases of this disease, and none of them in Ireland. The case which impressed him most was one that he saw in Vienna. A man, aged between thirty and forty, after having drunk tolerably hard, fell down stairs and was found unconscious at the bottom of the steps. He was brought to hospital; and after he became conscious the first thing he complained of was intense thirst. Polyuria occurred shortly afterwards, and he developed all the symptoms of diabetes insipidus. That case was under the care of Professor Nothnagel. Another case which he saw in Vienna was that of a young man who, whilst in charge of a spirited horse, tripped and fell, and received a kick from the horse on the back of the head. He was brought to hospital, and the first symptom that he developed was not intense thirst but polyuria. It was pointed out by the professor that the nerve-centres which presided over the feeling of thirst, and over the secretion of urine respectively, were probably connected together, and that in the first of those cases the shock fell with the greatest severity upon the former, and in the second upon the latter. In Mr. Burgess' case it did not seem probable that the disease dated from the child's fall on her head; it was rather connected with the obscure attack of fever. He would ask which was the first symptom in that case—the intense thirst or the polyuria? The disease in question might be very easily confounded with Bright's disease; but in the case before them the complete absence of the cardio-vascular signs, and the complete absence also of the smallest trace of albumen in the urine put out of court the possibility of the case having been one of chronic Bright's disease.

Dr. Doyle mentioned a case of a gentleman, thirty years of age, who had been in the habit of taking large quantities of drink of all kinds. He suffered from alcoholic paralysis, had hemiplegia, and developed acute mania. He passed immense quantities of urine of a very low specific gravity. He (Dr. Doyle) gave him small doses of phosphorus, with the result that he got quite well and was now in perfect health.

Dr. S. M. Thompson mentioned a case of this disease, occurring in a young lady, which he treated with phosphorus. There had been no lesion as a cause of the occurrence of the disease.

Dr. Shaw mentioned a case, which he attended, of a child, five

or six years of age, who was attacked with the disease in question, the symptoms being intense thirst and excessive passing of water. This went on for two or three years. He treated the disease with opium. The patient eventually developed meningeal irritation and effusion on the brain.

Dr. J. Barton stated a case of a policeman—a man of large size—who came to him suffering from polyuria. He had been during all his previous life perfectly healthy, and had received no injury whatever; but all of a sudden he began to be very thirsty and to pass immense quantities of urine. His urine, on examination in Trinity College laboratory, was found to be perfectly free from albumen or sugar. The symptoms had been present for two or three months before he saw the man. He first gave him extract of belladonna, which did him no good. He tried a good many other things, and finally gave him pulverised opium; and after having taken it for a fortnight the patient got perfectly well, and had had no return of the disease.

Dr. Peacocke asked had Mr. Burgess found anything to be effectual in alleviating the thirst, which was a distressing symptom in other diseases as well as the one in question. Phosphoric acid and other things had been recommended; but his (Dr. Peacocke's) experience of them was that they were failures. Some years ago he saw a case of diabetes insipidus in the Adelaide Hospital. The patient got gradually weaker and weaker, and eventually died. On a *post-mortem* nothing abnormal was found beyond a certain hypertrophy of the bladder.

Dr. James Little related a case which came under his notice, a great many years ago, of a clergyman who came home from Australia and suffered from excessive thirst and excessive secretion of urine. There was a record of the details of the case; but he (Dr. Little) could not at the moment recollect the quantity of urine that he used to pass. After having been many weeks under his care the patient gradually became comatose and died. The density of his urine was never more than 1003, and it was quite pale and did not contain albumen. At that time they did not estimate the amount of urea as was done now. During the patient's life he was perfectly certain that the disease was diabetes insipidus. On a *post-mortem* his bladder was found to be not much distended, but its walls were immensely thickened, and there was no sign whatever of cystitis. Apparently there had never been any inflammation of the mucous membrane of the bladder. The

ureters, however, were nearly as enlarged as the small intestine of a child. He had nothing whatever like what was known as surgical kidney. There appeared to have been an obstruction to the outgo from the bladder by reason of the enlarged prostate; but from some reason he had escaped cystitis. The process developed in the course of the disease appeared to have been mechanical. Not long ago he (Dr. Little) saw what he considered to be another case of this disease; and the gentleman was still alive.

Dr. Lentaigne remarked that in the case of the clergyman just narrated by the Chairman, if a catheter had been used perhaps the case would have terminated differently.

Mr. Burgess (in reply) said he did not think he reached, in the case he had submitted, the proper way of using the valerian; but it was the only drug that diminished the amount of urine that was passed. The great difficulty, in cases of this disease, was to keep the patient properly under observation. In his case the child was not sick but ate her meals and ran about. There was no necessity for medicine, but when it was given it was hard to keep the patient at it. He managed to keep the girl under treatment for about six weeks. The only interest he claimed for the case was that it was one of polyuria which had been kept under observation for 18 months. He tried the treatment alluded to by the President, but found it worthless. He did not try arsenic. As to the order in which the symptoms occurred, the account of her people was not to be absolutely relied on, but they said the first symptom that attracted their attention was the excessive thirst. The fever she had was evidently typhoid. He had tried opium as a remedy in this disease, but had not had happy results from it. He hoped to have the girl under observation for a considerable time, and to be able to give the Section further information as to the case.

THE SIGNIFICANCE OF DILATATION OR GASTRECTASIA IN FUNCTIONAL AND ORGANIC DISEASES OF THE STOMACH.

By M. A. BOYD, M.D.;
Physician to the Mater Misericordiæ Hospital, Dublin.

[Read in the Section of Medicine, March 12, 1897.]

Gastric dilatation, or gastrectasia, in one or other of its forms, is so frequently present in almost all organic or functional affections of the stomach, and its existence is so frequently overlooked by us in hasty examinations of that organ, that I may be pardoned for going into the details of the various affections in which this symptom is met with. I may say, at the outset, dilatation of the stomach is not a disease, but only a symptom of disease.

Gastric dilatation presents itself in two forms—complete dilatation and incomplete or partial dilatation.

In complete dilatation all the coats of the entire stomach are stretched, and its cavity enlarged to twice or perhaps thrice its original size, the organ extending across the abdomen from one hypochondriac region to the other; or when the stomach is dislocated downwards by the weight of its own fluid contents and the yielding of the gastro-hepatic ligaments, we may find it occupying the entire of the lower portion of the abdominal cavity, extending from one iliac region to the other. In the second form—incomplete or partial dilatation, sometimes spoken of as distension of the stomach, which is quite a different condition—we find only one portion of the stomach dilated—the cardiac end. That this form is a true dilatation and not a distension is shown by its liability to persist as long as the causes that produce it are present; in this it resembles dilatation of the cavities

of the heart. In this variety the dislocation is upwards, by which I mean the yielding of the stomach wall at this portion causes it to press upwards against the diaphragm, or upwards and to the left in front of the spleen, where it does not meet with the same resistance as is offered by the diaphragm. When the latter is in a lax condition the dilated stomach presses directly upwards against the heart, producing a sense of uneasiness in the cardiac region, pain in left side, and occasional attacks of syncope.

The first variety, or that of complete dilatation, is mainly associated with organic disease of the stomach itself, accompanied by obstruction at the pyloric end. Obstruction giving rise to this aggravated form of dilatation is traceable to conditions in the pylorus itself, or the walls of the stomach in its vicinity, or to conditions outside of them. As a rule it may be broadly stated that persistent dilatation in an aggravated form is always due to lesions within the stomach cavity. The causes acting from within the stomach leading to obstruction of the pylorus in the order of their frequency, according to my experience, are—(*a*) Cicatrisation of simple ulcers in the neighbourhood of pylorus; (*b*) Malignant disease attacking the pylorus; (*c*) Fibroid thickening of pylorus, the result of inflammatory changes; (*d*) Inflammatory conditions of the mucous membrane of the stomach and pylorus, leading to pylorio spasm (such is the condition found in fatal cases of what is called the acute dilatation of alcoholics); (*e*) Foreign bodies—such as coins or plum stones—retained in the stomach and forming sacculated diverticula in the neighbourhood of the pylorus; (*f*) Pedunculated tumours growing from the wall of the stomach and falling against the pyloric opening.

The causes arising outside the pyloric walls leading to obstruction and dilatation are—(*a*) Pressure on the pylorus and duodenum by an enlarged organ in its vicinity, such as

we find in some forms of enlargement of the liver or gall bladder; (*b*) Tumours in the fissure of the liver especially; (*c*) Pressure on pylorus of peritoneal or retro-peritoneal tumours; (*d*) Floating kidney; (*e*) Cystic disease of kidney pressing forward; (*f*) Kinking of duodenum or pylorus from non-yielding of gastro-hepatic ligaments, when stomach is dragged down by the weight of its own fluid contents when in a dilated condition.

If we direct our attention to the second form of dilatation, which I have alluded to as partial, and which is the form most frequently met with in all functional gastric troubles, and consider the causes that give rise to it, we find these causes for the most part associated with derangements of digestion, where from alteration in the gastric contents gases are generated, which by their continued distending action lead to dilatation of the stomach cavity; but the most frequent cause of this partial dilatation, in my experience, is an atonic condition of the muscle wall of the stomach, and as the cardiac end is the most muscular portion an atonic condition of this muscle is more likely to be followed by yielding of this particular end than towards the pyloric one, which is more fibrous in structure. This form of dilatation is consequently found in all adynamic conditions. It is present in all forms of anæmia, pernicious anæmia included, and is constantly present in chlorosis, but not where gastric ulcer is associated with that affection, as the condition of the stomach in gastric ulcer is the very opposite to that of dilatation—namely, one of irritable contraction of its muscles from the irritation produced by the ulcer and the excess of HCl present with it.*

You find this form of dilatation in nearly all cases of advanced phthisis also as a consequence of long-continued illnesses with pyrexia, such as in typhoid fever, being fre-

* When dilatation of the cardiac end is present in association with gastric ulcer, hour-glass contraction of the stomach is usually found.

quently present during the convalescent period following that affection.

You find it accompanying the exhaustion of long-continued suppuration either in bones or elsewhere, also after many of the exanthemata and after influenza. In children such form of stomach dilatation follows sub-acute gastritis or gastro-enteritis, but dilatation is rare in children except from this cause. We meet with it in that important form of degeneration of muscles characterised by fatty changes, and also in chronic alcoholism which is frequently accompanied by such changes. Acute dilatation, due to paralysis of the essential nerves of the stomach (the pneumogastrics) should be mentioned here, but it more properly belongs to the graver form of dilatation.

Having enumerated the causes that lead to both forms of dilatation I will briefly allude to the symptoms characteristic of each.

In the first form there is aggravated dilatation, and sooner or later the stomach is dislocated downwards. The symptoms of this condition are most characteristic. Prominent amongst these symptoms is vomiting. This vomiting differs in the time at which it occurs, and in its character from the vomiting that takes place in other affections of the stomach; it does not take place after a meal, nor does it come on once a day, or twice a day, but generally every other day, and frequently takes place only at night (a most characteristic symptom of dilatation), or the intervals between attacks of vomiting may be extended to days, or even to a week or longer.

In other forms of stomach affection where vomiting occurs it is usually the result of some article of diet that disagrees, or some inflammatory or irritable condition of the stomach produced by food, and the vomiting as a rule follows the ingestion of such food; such is the condition of things in

gastric ulcer and acute and sub-acute gastritis. Though patients with dilated stomachs do not suffer from vomiting after food, some hours after food is taken they complain of pain, heartburn, and gaseous eructations, which are repeated after each meal, and which are ultimately only relieved by vomiting.

When the intervals between acts of vomiting are counted by days the stomach in my experience is usually found dislocated and very much dilated.

In no other gastric affection accompanied by vomiting is the vomited matter so acid or so large in quantity as in cases of dilatation. Patients themselves will express the opinion that they vomit more than they eat or drink. The vomited matter is, as a rule, frothy, and when allowed to stand for some time bubbles will appear on the surface, due to fermentation and the evolution of gases.

If we examine it chemically, and by the aid of the microscope it will be found that the acidity is rarely due to hydrochloric acid, but to the volatile or organic fatty acids—lactic, butyric or acetic. Microscopically we find great numbers of fungi associated with fermentation—sarcina when the liquid contents are retained for a considerable period, say a number of days; torula when the intervals between the attacks of vomiting are shorter. We find also bacteria in great numbers. During normal digestion bacteria are never found, nor are they likely to exist in healthy gastric contents, more especially the hurtful organisms which are destroyed by the antiseptic action of the hydrochloric acid in the gastric secretion. In aggravated cases of dilatation this acid is found in only small quantity—not sufficient to kill off bacterial growths, which continue to grow and generate toxines.

The most salient and characteristic physical sign of dilatation is splash on succussion of the stomach. It is not easy

in all cases to ascertain the presence of this peculiar splash. Mere jogging of the stomach alone in one direction or another will not always determine its presence, and especially if this manœuvre is confined to the epigastric region alone. When dislocation has taken place the entire abdominal cavity has to be searched before this symptom is elicited even though dilatation to a formidable extent is present. It is also absent in many cases, owing to the stomach being emptied by vomiting previously, and after lavage by the stomach tube, as a considerable quantity of fluid and air must be present for its production. To nothing can I better compare this peculiar splash than the sound produced in an incompletely filled water bed by jogging or shaking it, or to the splash produced in a water tank by agitation. It has come to be known by the students of our hospital as the water-tank sound of dilated stomach.

Another constant symptom of the graver form of dilatation is obstinate constipation, the bowels often not moving without the aid of purgatives for days or even weeks at a time, and then only imperfectly, the evacuations being dry and lumpy, and lodgments in the colon being not an infrequent accompaniment. This condition always indicates a very considerable narrowing of the pylorus, through which the stomach contents are not passing, and the intestines losing the stimulus the stomach contents afford cease to secrete, and pass themselves into an atonic condition. If with this dryness of the bowel vomiting of all stomach contents is constantly taking place a desiccation of the tissues ensues, and some authorities consider a fatal termination results from this cause more than from any other. Tetany, extending from the muscles of the abdomen to the extremities and muscles of the neck and back, often accompanies this condition, and I have seen it prove fatal. This tetany would seem to be due not so much to this desiccation as to the

absorption of some toxine from the stomach contents. Another symptom associated with dilatation, and generally indicative of considerable obstruction at the pylorus, is visible contraction of the stomach seen through the abdominal wall. The contractions generally travel from left to right, and may be excited by pinching or stroking over the stomach. They are due to hypertrophy of the muscle wall of the stomach in trying to force its contents through the narrowed opening of the pylorus, such hypertrophy being similar to what occurs in the left ventricle of the heart in aortic obstruction. Cramp in the fingers are frequently complained of by patients the subjects of dilatation, and nodular growths on some of the joints of the phalanges are present in a great many cases, as pointed out by Bouchard. Coldness of the feet and hands, and redness of the nose, acne of the face and back, and attacks of urticaria are frequent symptoms. We sometimes find evidences of vaso-motor disturbances, such as sweating of the face and body, often of one side only, and accompanied by a peculiar pungent, acid smell, probably due to the elimination of the fatty acids by the skin.

I will now direct your attention to the symptoms that are indicative of the second form of dilatation I have alluded to as that of partial dilatation. As this form of dilatation is found accompanying almost all the stomach affections known as dyspepsias, it is constantly present in that form of functional derangement known as catarrh of the stomach, an affection which may arise from ordinary cold-catching, as a patient may get a cold in the stomach as readily as in the head or throat. It is also found in the gastric catarrh associated with cirrhosis of the liver, and with valvular lesions of the heart where the liver is enlarged. Gastric catarrh, however, owes its origin more frequently to ingestion of unsuitable food or liquid, which when retained too long in the stomach (the gastric secretion being defective) undergoes

fermentative changes, such, for instance, as the catarrhal dyspepsia which is so common an affection in those who live constantly on tea and uncooked starch foods.

Here not only the quantity of the liquid taken, but the character of the food, is favourable to fermentation and the formation of the fatty acids. We find as articles of diet amongst the poor bread unsuitably baked, or other badly-cooked starchy food, such as potatoes, which are very prone to undergo fermentative changes, leading to the formation of acids, especially acetic acid. Amongst the poor, too, there is a great tendency, when dyspepsia is present, to seek relief by means of alcohol in some form. The alcohol taken under these conditions is liable to contribute still more to the acetic acid fermentation, and to cause with lactic and butyric acids the acrid sensation and heartburn such patients so frequently complain of.

You will always find the minor form of dilatation present in such cases if you look for it, and the splash characteristic of it in the left epigastric and hypochondriac regions. In a former portion of my paper I alluded to the frequency with which this minor form of dilatation is met with in all atonic conditions; in some cases it would seem that an intrinsic atonic condition of the gastric muscle just as frequently results from the poisons that are absorbed into it during defective digestion, and directly paralyse its functions. Turck has quite recently investigated the toxines of the stomach in cases of gastritis associated with dilatation, and found that the filtered contents injected into rabbits produced paralysis in an hour and a half, and in larger doses killed. A reference to his paper will be found in the *New York Medical Journal*, February 22, 1896.

Constipation in patients the subjects of the minor form of dilatation is a very frequent symptom, but not to the same extent as in the graver form, and vomiting as a rule is not

present, the stomach contents ultimately finding their way into the intestine, by which they are absorbed with the toxines contained in them, and which produce the vague, nervous symptoms such patients complain of. Amongst these symptoms hypochondriasis is a common one, weariness on the slightest exertion and a disinclination for exertion. Headache, pain in the left side, and palpitation of the heart, and transient or intermitting anæmia are frequently present also. You also find symptoms referable to the lungs, throat, or bronchia in dilatation of the stomach where the contents are for some time retained, especially in the more aggravated form of the affection. I have lately had under my care in the Mater Misericordiæ Hospital a patient with dilatation, who, while undergoing some preliminary examination of his stomach contents preparatory to lavament, got a severe attack of spasmodic asthma to which he was not previously liable; he had not vomited for days previously and succussion showed the stomach dilated and filled with fermenting contents. In the middle of the night, without being exposed to cold in any way, he got an attack of asthma with considerable dyspnœa and bronchial obstruction, which persisted until his stomach was washed out, when it gradually subsided. That his attack of asthma was due to some toxine absorbed from his stomach I think there could have been no doubt of. What the nature of that toxine was I am unable to say; possibly it may have been due to the fatty acids—butyric or lactic—being eliminated by the bronchial mucous membrane. They are principally eliminated by the skin, but also by the lungs, and it is possible the attack of asthma in this case may have been due to their elimination by this channel.

We know other toxines in the blood produce asthma—uræmia and gout for instance—and we know that many of the toxines formed in the stomach affect the individual in

various ways, some of them causing spasm and cramps, and others, as in Turck's experiments, causing paralysis and neuritis. The most reliable symptom indicative of the partial form of dilatation, as it is of the graver form, is splash on succussion. This splash in cases of left-sided dilatation is invariably found when the stomach contents are delayed and fermenting, and is never found in a healthy stomach, no matter what the amount or what the character of its contents. It can always be obtained by succussion of the stomach in the left epigastric region in an upward and outward direction in a line between the umbilicus and the left costal cartilages. When the stomach is dilated but empty a tympanitic note takes its place, with this difference—that the tympanitic note is heard over a large area of both the left epigastric and hypochondriac regions, and extending from here upwards to the left nipple, and outwards from this level to the mid-axillary line. Under few circumstances is a tympanitic note heard in this situation, differing from that of ordinary thoracic resonance, except in dilatation of this end of the stomach. It is consequently always as reliable of this condition as the splash sound, and both together are conclusive.

Our methods of diagnosis at the Mater Misericordiæ are:—If in an hour or two after a test meal splash is elicited, or splash and a tympanitic note extending to or near the nipple line, dilatation is diagnosed. If the splash is heard at the end of five hours or longer an atonic condition of the muscle wall of the stomach is assumed to exist. To ascertain whether the dilatation is due to fermenting contents or atony alone, we syphon off the contents at different periods after the test meal and examine it chemically. If lactic acid persists for some hours after the test meal, hydrochloric acid being absent, or present in only small quantities, lactic acid fermentation is present; if it is constantly present, with

hydrochloric altogether absent, cancer of stomach or pylorus is usually diagnosed.

If butyric, lactic and acetic acids are found there is no doubt fermentation of food contents is going on. If the solvent power of the pepsine present is feeble in its action on proteids, or produces no solvent action on them, secretion is defective, or atrophy of gastric glands is diagnosed. For the determination of the existence of hydrochloric acid either Toepfer's test (dimethyl-amido-azobenzol), the benzo-purpurin, or Gunzburg's phloro-glucin and vanilin tests are used. For the detection of lactic acid a watery solution of perchloride of iron is used, which is a very certain test. Butyric and acetic acids are detected by their smell when the filtered gastric contents are treated by ether, which extracts them out.

The chemical test for an atonic condition of the muscle wall of the stomach (the pylorus being pervious) is the administration of salol, which is unchanged by the stomach, but splits up into its component elements phenol and salicylic acid when it reaches the intestines, the salicylic acid being secreted by the kidneys and appearing in the urine as salicyluric acid.

If this acid is not found in the urine until some hours after the administration of the salol an atonic condition of the muscle wall of the stomach is assumed to exist. For the extraction of the contents of the stomach we find the ordinary syphon India-rubber tube, such as is used for washing out purposes, quite sufficient. When passed into the stomach and allowed to remain for a few minutes the part projecting in front of the teeth is throttled and held so until withdrawn; a drachm or two of the contents of the stomach is found in the end of the tube near its point, which is found quite sufficient for all purposes of examination. The tube and funnel which I use for both extraction and washing-out

has a stop-cock fitted to it, which ensures all air being shut out in the process of extraction.

The title of my paper did not include a description of the methods of treatment in cases of dilatation, but I do not wish to dismiss the subject without a few words on that all-important point. For cases of the graver form of dilatation associated with obstruction at the pylorus, where, arising from within the stomach, a suitable pyloroplasty, or gastro-enterostomy, is the only form of treatment likely to produce a cure, or to procure amelioration of the distressing conditions present; and when contractions and cramp of the stomach or symptoms of tetany arise, operation should be urged at once.

The only other alternative to procure temporary relief is washing out the stomach. I know of no other treatment in the graver form of dilatation which brings so much comfort to our patient, and even in the lesser form of dilatation I have no hesitation in resorting to it when catarrh of the stomach with fermentation and acidity distress the patient. It is not necessary I should describe the methods of its performance, but a few words as to the best time for doing it may not be out of place. Lavage of the stomach is always best done in the morning before food is taken, as by that time the food of the previous day, if not digested normally, is at all events liquefied sufficiently either by fermentation or by growing colonies of bacteria to prevent its blocking the tube in the process of extraction. Having ascertained the size to which the stomach is dilated, from a pint to two pints of hot water is first injected through the tube and then syphoned back, so as to thoroughly wash the cavity. Next, a pint of some alkaline solution is introduced without withdrawing the tube, and allowed to remain for a few minutes while the stomach is agitated between the fingers, and then syphoned back and the tube withdrawn.

The selection of the solution is not a matter of much importance—lime water answers very well, or a few teaspoonfuls of bicarbonate of soda, potass, or lithia dissolved in a pint of hot water, or if the breath is fœtid some boric acid, peroxide of hydrogen, or sanitas may be substituted.

Turck has lately introduced a novelty in the shape of an instrument for gastric dilatation, which he has called a gyromele. This instrument consists of a flexible cable, to the end of which is attached a spiral spring covered with a sponge. To determine the outlines of the dilated stomach the tube is introduced into the organ, and the apparatus set in motion. The revolving sponge can be easily palpated through the abdominal wall along the entire length of the stomach. The gyromele can be used as a therapeutic agent as well. In chronic catarrh of the stomach the revolutions of the sponge are extremely useful in effecting the removal of mucus from the surface of the mucous membrane, while in atonic conditions of the organ the friction thus applied to its inner surface acts as a stimulant to the muscular tissue. Weak solutions of nitrate of silver on the sponge have been recommended as an application to the mucous membrane in this manner. Massage of the stomach is also a most important method of treatment in the atonic variety of dilatation. Electricity I have tried, but I am disappointed with it, and rely more on careful massage to effect good results.

To check fermentation I generally prescribe creasote or carbonate of guaiacol combined with bismuth, or sulphurous acid, or the hyposulphites, just as I find them to agree best; and where pain is present iodoform, carbolic acid, or ichthyol in pill combined with opium or Dover's powder.

The minor form of dilatation is generally very amenable to treatment, careful regulation of the diet being in many cases the principal treatment necessary where injudicious dietary leading to fermentation is the cause. When a certain

amount of catarrh is associated with this I find the alkaline carbonates—especially the bicarbonate of soda, with nux vomica and a vegetable bitter, taken before food—very efficacious; it has the double property of dissolving mucus and exciting a more healthy acid secretion afterwards, besides lessening the tendency to acid fermentation. The addition of bismuth to such a combination is also very comforting if there is much gastralgia or heartburn present. If after this treatment for some days splash is still elicited four of five hours after a meal, an atonic condition of the gastric muscle is probably present, and I then give, in addition, four or five drops of liquor strychniæ after each meal. I consider no other drug to compare with it when a lax and atonic condition of the stomach wall exists. Purgatives given at the same time have a most wonderful influence in emptying a full, dilated stomach; the peristalsis of the intestine excited by them seems to be communicated to the gastric wall reversely and to excite its contractions. Where catarrh is chronic and constantly leading to dilatation occasional lavage combined with above treatment will generally effect a cure. Pepsine, though often prescribed in such cases, I have little faith in as a means of treatment. It is at best but temporising, and its administration seems to me both unscientific and useless; in my experience it often sickens the patient and increases the dilatation present, and certainly does not lessen the fermentation.

In cases of atrophy of the gastric glands, and of marasmus in advanced cancer of the stomach walls, when combined with hydrochloric acid it assists the patient to digest proteids, but it is not as efficacious with a mixed diet in this respect as many of the malt extracts.

A consideration of the various kinds of food suitable for the different conditions that lead to dilatation I have not touched on, and I have contented myself with calling atten-

tion to the more obvious methods of treatment I have found usually efficacious.

Dr. Doyle said he believed that a tube with as large a lumen as possible was the best for lavage. Lung troubles, he believed, such as chronic bronchitis, were causes of partial dilatation of the stomach, brought about by the passive congestion interfering with the nutrition of the organ. Another cause was the badly kept condition of the teeth of the poorer classes, and the short time given by them to the proper mastication of their food, which was usually of a starchy nature.

Dr. Potter said that he had frequently found a large teaspoonful of vegetable charcoal, taken an hour or two after meals, very beneficial in the treatment of dilated stomach.

Dr. Tweedy remarked that with reference to the constipation which usually occurred in connection with dilatation of the stomach, he considered that this symptom could be explained by mechanical means, and that it was not necessary to seek for a definite pathological cause. He referred to a case which he had formerly shown, where the stomach filled almost the entire abdominal cavity, the condition having been brought about practically by the continual eating of large quantities of potatoes, and he thought that the pressure of the stomach filled with a large quantity of food of this nature, which cannot be got rid of as quickly as it ought to be, was one cause of constipation. Constipation could also be accounted for on anatomical grounds. He explained that the first portion of the duodenum was about two inches in length and freely movable, while the second portion was fixed. It was therefore evident that a dilated stomach filled with starchy food could, by drawing down the pylorus and with it the first part of the duodenum, produce a mechanical kink at the junction of the first and second parts of the duodenum sufficient to cause obstruction to the free passage of food.

The President asked if Dr. Boyd meant by partial dilatation a condition in which one end of the stomach was dilated and not the whole organ. He was not quite sure that Hilton Fagge was correct in saying that there was fibroid thickening of the pylorus in cases of complete distension. Fagge described acute dilatation of the stomach, and mentioned at least one case in which dilatation occurred so suddenly that coma set in and death followed. He

(the President) believed that muscular wasting was really at the bottom of many forms of dilatation, but the exact cause of the wasting he did not know. He asked if the pylorus had ever been stretched as a treatment in this country. The extent of the dilatation could be made out by giving the patient effervescent powders, or by filling the stomach with large quantities of fluid. He asked if Dr. Boyd was convinced that the splash sound obtainable was always diagnostic of dilatation.

Dr. Boyd then replied.

TWO CASES OF RELAPSE IN SCARLATINA.

By E. MAC DOWEL COSGRAVE, M.D., F.R.C.P.I.;

Professor of Biology, Royal College of Surgeons, Ireland;
Physician to Cork-street Fever Hospital, Dublin.

[Read in the Section of Medicine, March 12, 1897.]

During the course of a case of scarlatina various rashes may appear in addition to the specific one; sometimes these are "accidental," being caused by local applications or digestive troubles; sometimes they denote the presence of a second febrile process, and in this way the rashes of measles, Rötheln, chicken-pox, enteric fever, &c., may be met.

Sometimes, however, the second rash is a punctiform scarlatinal rash, and the severity of the course of the febrile disturbance, the accompanying symptoms and the resulting desquamation, show that the second rash is due to a true relapse.

A very valuable summary of the literature of the subject up to 1891 is given by George P. Boddie., M.B., in the *Edinburgh Medical Journal* for October, 1891,[a] and seven additional references are given in the last Appendix to "Neale's Medical Digest."[b] Six out of the seven references are to papers which appeared in the *British Medical Journal*. Although by a reference to these two summaries it is seen that a fair number of cases of relapse are on record, it must be remembered that scarlatina is an extremely common disease, and that, therefore, the percentage of cases in which relapse occurs must be extremely small.

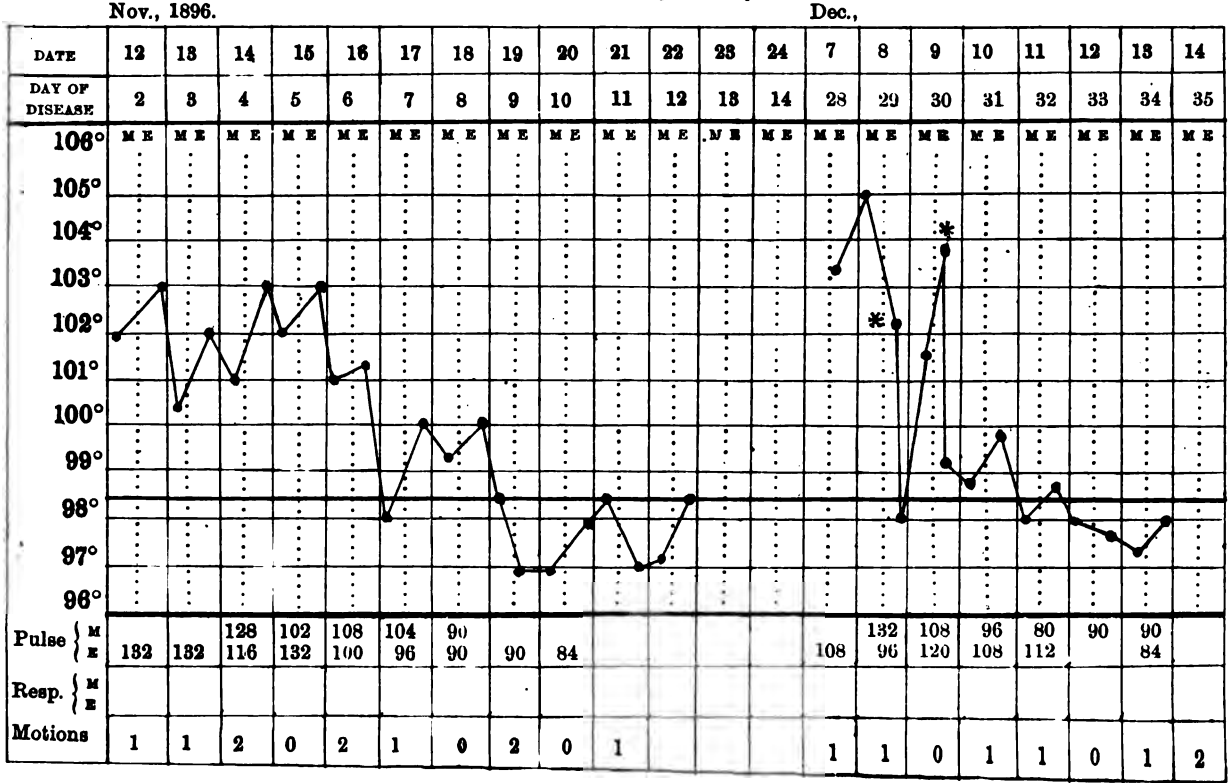
A true relapse must, however, be distinguished not only

[a] On Relapse or Recrudescence in Scarlet Fever; Two Cases, with a Note on the Literature of the subject.

[b] Up to August, 1895.

TEMPERATURE CHART

Case I.—P. B., aged nine years.



from accidental rashes, but from true second attacks. The best definition of a relapse is Körner's :—A true relapse in scarlet fever is quite analogous to the relapse in typhoid; the first febrile process is completely gone, usually desquamation has appeared, sometimes even terminated, when there sets in a renewed manifestation of the disease. There appears for the second time a characteristic scarlatinal exanthem, all the symptoms of the illness begin anew, sometimes worse than in the first illness; often the new exanthem completes the former." [a]

For the careful notes of the two following cases I am indebted to the kindness of Dr. Ernest A. Bourke, who at the time the cases were under treatment was Assistant-Resident Medical Officer at Cork-street Hospital.

Case I.—P. B., a girl of nine years of age, was admitted into Cork-street Hospital under my care, on the second day of illness, on November 12th, 1896. She had a very extensive dark-coloured rash, almost purpuric in appearance; well-marked *tache scarlatinale*; the tongue was coated and the papillæ were prominent; the tonsils were inflamed, swollen, almost plum-coloured, and bore large patches of exudation; the submaxillary glands were swollen and tender; there was sleeplessness and delirium; the temperature on the evening of admission was 103°, the pulse 132. It was evidently a severe case of scarlatina anginosa.

The illness of other members of the family confirmed the diagnosis; as a sister, admitted on the same day, died, on the fifth day of illness, of scarlatina maligna, and four other brothers and sisters were admitted during the same month, all suffering from severe scarlatina.

The figures of the case need be but briefly noted; the temperature kept up to 103° until the fifth day; from that it fell until on the ninth day it was normal. On the sixteenth day of illness the patient was allowed up. There was no albuminuria; desquamation was well marked, the cuticle separating in large flakes.

On December 7th—the twenty-eighth day of illness, and twenty-sixth day after admission into hospital—when desqua-

[a] Quoted by Boddie, loc. cit., from Jahrbuch für Kinderheilkunde. 1873.

mation was finished on the trunk and upper extremities, but was still occurring in the legs and feet—the patient had an attack of vomiting; this was accompanied by headache, and pains in the limbs; towards evening a red rash appeared on the trunk and limbs, and the temperature rose to 103·4°, the pulse being 108.

December 8th. (Next morning).—The temperature had risen to 105° and the pulse to 132; the skin was hot and dry, there was a scarlet punctiform rash all over the chest, back and limbs; *tache scarlatinale* was well marked; the tongue was coated, its papillæ being prominent; the pharynx was red, the tonsils were inflamed and swollen.

December 9th.—The skin was still hot and dry; the rash on the body was still bright-coloured and punctated; the *tache scarlatinale* was especially well marked on the back; the skin around the mouth and at the sides of the nose was still free from rash; there were well-marked petechial lines at the bend of the elbows, and in the popliteal spaces; the kidneys were acting freely and the urine contained a little albumen, which persisted for two days, but there was neither blood nor tube-casts.

December 10th.—The rash was fading; the coating was clearing off the tongue and the enlarged papillæ were prominent; the tonsils were still swollen.

December 11th.—The temperature fell to normal; and four days afterwards, on the eighth day of the relapse, secondary desquamation commenced on the arms, the sides of the neck and the axillæ. A week later there was well-marked flaky desquamation on the body, on the arms and about the axillæ; and a few days later there was slight secondary desquamation of the hands.

The patient was discharged on January 6th, 1897.

Case II.—J. D., a girl of nine years of age, was, on the 27th November, 1896, admitted into Cork-street Hospital under my care, on the fifth day of illness. There was a bright-coloured rash; the tongue was stripped, the papillæ prominent; the tonsils were inflamed and swollen. On the same day a younger sister was admitted; both children were suffering from mild but undoubted scarlatina.

On December 2nd desquamation commenced, and the case went on favourably until the morning of December 15th—eighteen days after admittance, and the twenty-fourth day of illness—when the child complained of headache and sore throat. That evening the

TEMPERATURE CHART

Case II.—J. D., aged nine years.

Nov. 1896. Dec.,

DATE	27	28	29	30	1	2	3	4	6	14	15	16	17	18	19	20	21	22			
DAY OF DISEASE	6	7	8	9	10	11	12	13	14	23	24	25	26	27	28	29	30	31			
106°	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E
105°																					
104°																					
103°																					
102°																					
101°																					
100°																					
99°																					
98°																					
97°																					
96°																					
Pulse M			96		96	96	88		96		128	120	102	96	90	78		72			
Pulse E	100	104	116	116	120	102	100	108	96		124	112	96			72					
Resp. M																					
Resp. E																					
Motions	1	0	1	2	2	0	1	0	1	1	1	2	0	1	1	1	0	2			

Enlarged glands.

Relapse.

* Guaiacol, 7 minims, applied epidermically.

Cases of scarlatina, he said, should be removed as soon as possible after the patients get up to Convalescent Homes for Infectious Cases.

Dr. Mac Dowel Cosgrave, in reply, said that in Cork-street Hospital the patients were not kept as long as possible in the same ward, but were removed to another ward, and very often to another building. There was a Convalescent Home, he said, in connection with Cork-street, and, so far as possible, the cases were kept separate.

CLINICAL PICTURES OF CHILDREN'S DISEASES.

By W. LANGFORD SYMES, M.R.C.P.I.;
Late Clinical Assistant, Deputy Medical Registrar and Pathologist, Hospital for Sick Children, Great Ormond-street, London.

[Read in the Section of Medicine, April 9, 1897.]

SOME INTRODUCTORY REMARKS ON THE DIARRHŒAS OF CHILDREN.

THE enormous mortality amongst infants and children from this disorder, and its extreme frequency, are my sole excuses for submitting so very ordinary a subject for your consideration; for I hold the strong conviction that the more frequent the disease, and the more fatal its results, the greater claim it has upon our attention as physicians.

In few subjects have such rapid advances been made as in the pathology of these affections.

Perhaps no more difficult task could be set one than to write a succinct account of diarrhœa and diarrhœal diseases of children. I can here only attempt its very brief introduction.

Diarrhœa is truly a symptom, and a symptom only, a symptom usually of disease of the intestine, and of very different pathological states; but in its clinical forms it often assumes the garb of a most dreadful and fatal disorder. It is of this symptom I would speak, and in this short review would allude merely to what we might term the functional cases, omitting such organic diseases as typhoid, or tubercular ulcerations, or other gross structural enteric lesions.

Many may rightly argue that it ought to be banished from

our list of distinct diseases; but we have scarcely yet arrived at this pitch of excellence in our pathology.

Infants are very subject to diarrhœa. It appears also to be most frequent amongst children under one year of age.

In England and Wales in 1894 the deaths of children from diarrhœa under five years old amounted to 9,005. Of these, 7,360 were infants under one year; 1,332 occurred during the second year; while in the third, fourth, and fifth years combined there were only 313. Again, in London, 72 per cent. of all fatal diarrhœas occur in the first year of life.

These figures alone show us that this subject is one that we cannot, in any way, make light of.

It very frequently will be found to complicate other diseases of infancy and childhood, and one often sees cases of chronic diseases swept away in two or three days by a sudden and profuse diarrhœa.

The old idea that diarrhœa was good for children during "teething" has increased the deaths in past years.

One or two preliminary facts, which have been established, must be fully recognised before we can go further.

The alimentary system is a continuous one, composed of a series of organs of somewhat analogous functions. Derangements of one section of the canal can affect portions above and below it, and the organs communicating with it. Some digestive juices and secretions in infancy are practically inert; others are feeble or limited to particular kinds of food. The salivary glands, for instance, are imperfectly developed, and the saliva of children under three months is said to be very deficient in amylolytic activity. The pancreatic juice is even more deficient. The gastric juice is comparatively unfitted to dissolve cell envelopes as its corrosive powers are weak. The infant appears to digest its milk very largely in the small intestine, while the stomach acts chiefly as a recep-

tacle or reservoir. The stomach is more a receiver in which the milk is coagulated than a truly digestive organ, and the milk passes through the pylorus in curds to be digested further on (by the pancreatic juice). We must thus recollect that milk is not truly a liquid diet, for it becomes solid in the stomach. The difficulty of digesting the curd of cows' milk is too great for the infant's delicate digestive organs. Residual undigested casein acts as a foreign body, and gives rise to irritation, and a copious discharge is Nature's effort to get rid of it.

Recognising these facts we can readily understand how indigestion must so frequently become a source of diarrhœa.

In breast-fed children maternal influences have occasionally altered the milk and affected the child. Drugs, improper food, grief and mental influences, temper, or actual illness on the part of the mother, can sometimes act on the infant at the breast.*

At present we do not know the exact capacity of a child's

* *Cf.* Dr. Cautley's interesting book on "The Feeding of Infants," chapter VII. Churchill, 1897.—Our latest investigations on the alterations in human milk show that it may be increased by the ingestion of fluids—milk, gruel, cocoa, broths, &c., also by moderate use of stimulants—ale, porter, Burgundy, and white wines; by improvement in health, by pilocarpin, electricity applied to the breast, and frequent suckling. It is diminished by saline cathartics, belladonna, and atropine. Menstruation may sometimes affect it; but observations on fifty-two children suckled by menstruating women showed less difference in its composition than is found in milk from the same individual at morn, noon, and evening. These conclusions were that menstruation is not necessarily injurious to the child; that colic, dyspepsia, and enteric catarrh should be regarded as coincidences; but that metrorrhagia may retard the development of the child. In the fifty-two cases alluded to only one became dyspeptic, but grew fat, and all the others were perfect. Moderate quantities of alcohol can be taken without any appearing in the milk (*e.g.*, one glass of wine, or half a pint of malt liquor), but excess may profoundly alter it and cause fatal dyspepsia and diarrhœa. Too much stress cannot be laid on the fact that a woman does not need stimulants merely because she is nursing. Colchicum or atropine given to the mother appear to affect the child; the former may produce diarrhœa, and atropine dilates the pupils of the child.

stomach. From the estimations we possess (chiefly German) it is said at 1 month to contain about 2 ounces,

3 „ „ „ 3 „

5 „ „ „ 4 „

hence it is easy to overfeed a young child.

In the upper classes the food may be unsuitable to the child, but in the lower it is often unwholesome, and poisonous in addition.

We must recollect that the contents of the bowel are practically outside the body physiologically.

A fatal hypersecretion or choleraic flux may be taking place into the lumen of the tube, and the child may die before it is voided per anum, before, therefore, it could correctly be called a case of diarrhœa.

Also many prolonged and chronic cases are often kept up by a deficiency in the thorough evacuation of the bowels; for nature appears to favour the frequent emptying of the infantile intestine.

The infant is only constituted to digest its mother's milk up to the time it gets its teeth. The amylolytic secretions which digest starchy food are not fully active in the first few months of life; they are not so much required. Farinaceous food, therefore, unless most carefully prepared and administered, ferments and irritates the mucous membrane of the stomach and intestines, the child vomits, and the bowels discharge their contents. In health children are often practically fed on raw starch, which they cannot digest; while in disease its administration under nine months is almost inexcusable.[a]

There is no form of carbo-hydrate present in human milk except lactose. Almost all condensed milks and patent foods in the market contain an excess of carbo-hydrates—generally

[a] We may take the appearance of six teeth as an indication that the child may have food of a starchy nature.

either starch or cane sugar. Nearly all the infants fed on these foods become fat, flabby, unwieldy, and rachitic, and from the intestinal fermentation suffer from offensive diarrhœa. Anæmia, scurvy, and rickets are also often produced by them.

Thus, unwholesome, improper, excessive, or irregular feeding is responsible for an enormous number of these diarrhœas of children. It may, of course, occur at any period of the child's life, but is most frequent during the first year. It may be a very acute and suddenly violent disorder, and can occur at any time or season of the year. This species of attack then forms one large class of cases which is doubtless very familiar to those who have had any experience of children.

When, however, this mechanical irritation is long continued, when this indigestion from errors of diet has become almost habitual, and when the unfortunate child is so placed that scarcely a meal is correctly provided for it, when it grows up sharing the sometimes indigestible fare of its elders, eats forsooth anything with which it may chance to be in contact, then this intestinal indigestion becomes an essentially established condition—a chronic process. The repetition of these errors produces persisting irritation of the intestine, and a wretched state of chronic diarrhœa is established.

It would be useful to find out whether "teething" actually causes diarrhœa or not. At this time children get hold of the most unwholesome things to chew and "cut their teeth" on, and in these substances lie many of the cases we hear of.

It is most remarkable that during times of great distress, as during the Siege of Paris, or the Lancashire Cotton Famine, the infant mortality is largely reduced, while the adult mortality is increased. The explanation is that from the scarcity of food the mothers are compelled to suckle their

children, and hence *the* great source of danger is abolished. Infants' food is very liable to become contaminated.

The children of the poor eat the most unwholesome things, and a vast amount of dirt along with them.

The fungus of thrush (Saccharomyces albicans) is capable of directly producing intestinal disorders and diarrhœa. It is very liable to attack the mouth. This organism is said to decompose milk like Bacterium lactis, and form lactic acid, and, according to some, butyric and formic acids also. Dr. Forbes Ross has directly produced thrush from the sour milk of an unclean jug; also, he has produced it from the fæces of some cases of diarrhœa; but it is a curious fact it was only in cases where the nates were excoriated that he was able to develop this fungus.

Why are rickety children so often liable to diarrhœa? Some say these children sweat more and hence are easily chilled, but the bad feeding which produces rickets may, I think, cause diarrhœa at the same time.

Another enormous class, and totally distinct category, of cases arises in a much more complex fashion. Every summer and autumn thousands of children are swept away by profuse and uncontrollable watery discharges from the bowels.

Sanitation affects children markedly; air-space, ventilation, drainage, situation, general home cleanliness, and water and milk supply.

It has long been thought that the filth and putrefaction of towns, animal exhalations, with atmospheric changes, caused this "summer diarrhœa" amongst children. Until recently, however, we got no further. How they operated was not fully explained. Dr. J. B. Russell has greatly aided us by his investigations and statistics in Glasgow of deaths occurring from this disorder. He finds that "the death-rate from diarrhœa of children under 5 years of age is now (1890–'94) exactly what it was 30 years ago (1860–'64),

while the death-rate at the age of 5 years and upwards is less by more than one-half." Improved water supply, therefore, in Glasgow has not influenced the infantile diarrhœas, though it has lessened by half those occurring over 5 years of age. In fact, the water-drinking school children have been saved, while the milk-fed infants still die in large numbers.

It is in July, August, and September, when the air is very hot, and decomposition going on in organic materials, that this summer diarrhœa is most prevalent, and that its mortality is highest.

In 2,000 cases of death amongst children from this cause[a] it was found on investigation that only 3 per cent. were breast-fed, revealing a most extraordinary immunity amongst infants nursed by their mothers. These diarrhœas, therefore, are found to affect artificially-fed children—97 per cent. of these 2,000 cases having been so brought up. A most valuable return of statistics of infantile diarrhœa was published last year (1896) by Dr. Niven, of Manchester. Through his kindness I am enabled to call attention to the following remarkable figures:—

Out of 500 deaths only 15 were being breast-fed when taken ill.

The relative chance of dying from diarrhœa of hand-fed as compared with breast-fed children, was as—

88 to 1 under 1 month old,
93 to 1 at 1 month,
And 123 to 1 at 4 months.

It is striking that these figures exactly coincide with Dr. Emmett Holt's finding in America—*i.e.*, 97 per cent. being breast-fed—while Minert, in Bavaria, finds 96 per cent. in his country.

Bacteriological investigators stepping in at this stage have

[a] Emmett Holt. *Cf.* Ashby and Wright, on Diseases of Children. 3rd Ed. 1896. P. 87.

since furnished us with a clue to the understanding of many of these conditions.

First of all they tell us that the fœtal intestine is *sterile*, but that a few hours after birth bacteria find an entrance to it. In the healthy nursing child two species of bacteria are said to be constantly found in the intestines. These are the *Bacterium lactis aerogenes* which inhabits the small intestine, and the *Bacterium coli commune* which lives in the colon and lower part of the ileum.

In cases of summer diarrhœa the intestinal contents are found to swarm with many species of bacteria, and some of these are very poisonous. These organisms grow and multiply outside the body, and are abundantly disseminated when the temperature of the air is over 60° F. They grow best in milk.

Unfortunately, milk is at this period of its life the infants' chief or only food; also, it is the very best cultivating medium in which these poisonous organisms can flourish.[a]

It is thus easy to understand how the hand-fed infant so frequently falls a victim to summer diarrhœa, and that this disease is almost confined to this period of life.

Human milk is a sterile fluid. Cows' milk is sterile only when obtained from the udder of a healthy cow by a trocar and cannula, but is usually acid when reaching the consumer, and is crowded with micro-organisms.

The milk obtained from the milkshops in London last year (1896) contained from 848,400 to over 8 million micro-organisms per cubic centimetre.

It has been found then that these summer diarrhœas are directly produced by infected milk, and some of these poisons have been isolated.

The absence of more positive data on these points is

[a] Lord Lister says—"I once met with a bacterium, but only once, that would not live in milk."

explained by the difficulty of reaching the small intestine; it is cut off from direct observation, and the putrefaction in the large intestine obscures the results.

Dr. Ballard in his supplement to the Report of the Local Government Board in 1887 concluded that:—

1. Summer diarrhœal mortality closely follows the indications of the 4-foot earth thermometer; only commencing definitely when the T. is over 58° F., and is highest at the highest mean weekly reading of this thermometer.
2. It is associated with unsanitary conditions.
3. Fatal diarrhœa is immensely influenced by the food which the infant takes immediately before an attack.
4. In the food the micro-organisms find a nidus and pabulum convenient for their development, that from the food, as from organic matter in soils, they can manufacture a virulent chemical poison, and that this chemical substance is, in the human body, the material cause of epidemic diarrhœa.

It is exceedingly probable then that these diarrhœas are due to bacteria in the superficial layers of the earth.

In an investigation conducted by Dr. Cameron, in Leeds, into 153 cases of fatal diarrhœa in children, for 6 weeks ending September 30, 1893,[a] it was found—

That 80 per cent. of the cases occurred in houses with no through draught;

That the mortality is the largest amongst bottle-fed children, smallest in breast-fed children, and is larger during the first 6 months of life than during the second 6 months.

This subject of classifying diarrhœa has for generations greatly perplexed medical observers. It would appear now that as we are getting a little more light thrown upon these

[a] *Cf.* Dr. Cautley. Op. cit. P. 7.

disorders they will become more simplified. A strictly anatomical classification is impossible. Those who have had most experience have failed to arrive at one, *because* there is no relation in any case of diarrhœa between the severity of the symptoms and the appearances found after death. Many forms are described, but there is no morbid anatomy to correspond. The severest symptoms, and the most fatal cases, frequently exhibit the fewest *post-mortem* lesions (*cf.* cholera); while a child, who during life has had but little diarrhœa, may reveal the most intense structural mischief in the intestines.

Given a typical case of death from diarrhœa, no one can tell what he will find in the intestine, or whether he will find any morbid change.

Therefore, no classification can be formed from morbid anatomy.

The most useful one is that I have shortly sketched, viz.:—

I. *Dyspeptic*, and

II. *Infective.*

It is based on the ætiology of these disorders, as far as we know them at present, and is a great help.

These types have been greatly confused by different writers, and a long list of vague pathological names have in past times been attached to them which are certainly not now warranted by *post-mortem* examinations, and cannot be borne out by facts.

Thus the names—

Muco-enteritis,

Entero-colitis,

Inflammatory diarrhœa,

have, in many cases, no pathological entity.

This ailment may be of all grades of severity; and between these several forms no very sharp line of demarcation can be drawn.

Seeing that in nearly every case is to be found the administration of some patent food with, perhaps, milk in various stages of decomposition from an apparatus impregnated with toxic germs, we can easily understand that fermentative changes are present in most instances. Deposits in dirty bottles teem with organisms. Tubes have been a fertile source of diarrhœa, and are often covered with a layer of decomposing "must."

A child with dyspeptic diarrhœa is very liable to contract the more infective forms, for its intestine is like a culture tube that is left open to many kinds of bacterial invasion.

Throughout the books we have endless forms described, resulting in a *melée* of names which confuse us. Many merely signify the character of the stool that is voided by the child—a description of the motion and not of the malady—while others are anatomical and, hence misleading. Thus:—"Ulcerative diarrhœa" is supposed to indicate ulceration proceeding in the intestine. "Nervous diarrhœa" is produced, apparently, solely by causes acting through the nervous system—fright, anxiety, &c.—and, certainly, with some cases, as in adults, the nervous system is intimately associated. "Lienteric diarrhœa" signifies that cognisable and particulate fragments of food are passed unchanged from the bowel. It is usually seen in children about five or six years old. The food produces an increased peristaltic action on the part of the intestine, and it often occurs at the end of a meal. The child complains of uneasiness in the belly, with griping, and this is quickly followed by a loose motion of undigested food. "Catarrhal diarrhœa" simply means that there is mucous in the motions. "Dysenteric diarrhœa" signifies that it resembles dysentery in the passage of lumps of mucus stained with blood. "Croupous diarrhœa" means that there are shreds of mucous membrane found in the stools at each motion of

the bowels. "Mucous diarrhœa" is similar to catarrhal diarrhœa, and merely describes a mucous stool.[a] "Febrile diarrhœa" and "Inflammatory diarrhœa" sufficiently explain the meaning of the terms, but convey no information as to the disease.

The frequency of evacuation is not a true guide to the condition of the child. It is often misleading. The case of cholera infantum which ceases to evacuate its bowels may be in extreme danger. It has been said that frequency of evacuation is not always a necessary symptom of diarrhœa. It is a natural therapeutic method of cure, and is strongly indicated. It is not the evacuation *per se* that is the evil condition to be treated, but the irritation and contraction of the bowel, and the hypersecretion of fluid into it.

Diarrhœa produces an alarming fall in blood-pressure in children. The loss of water may quickly collapse them, causing absorption of moisture from the tissues, shrinking of the limbs, and collapse of the features, depressed fontanelle, and a weak and failing heart. Intestinal irritation in children also profoundly affects the nervous system, and this has been so marked as to have often been mistaken for organic cerebral disease. Hence, in past years, the origin of the term "hydrocephaloid."

[a] Some years ago Professor Nothnägel investigated over 1,000 stools from cases of so-called catarrhal diarrhœa containing mucus, with a view to ascertain where the mucus came from, and hence the seat of the malady. His conclusions were that mucus passing from high up in the small intestine (jejunum and ileum) is invisible to the naked eye. It is disintegrated and intimately mixed through the motion, and the stools are passed without pain or straining. Under the microscope, however, islets or globules of mucus can be abundantly seen, and, may be, bile stained. A cursory examination, therefore, of the stool may not reveal any mucus whatever, although catarrhal conditions of the small intestine be actually present. Jaundice would, of course, point to the duodenum; but this is rarely seen in children. The colon, on the other hand, discharges its mucus visibly, with a pulpy motion. The sigmoid flexure voids it pure and unadulterated, while the rectum passes it surrounding scybala and accompanied by tenesmus and straining.

In young children the liver is very large, and, perhaps, the bile is of comparatively more value than in adult life, and the action of mercurials in these cases in part due to their stimulating action in producing a copious flow of this secretion.

Regarding the pathology of "green diarrhœa," there seems to be no consensus of opinion. Five different micro-organisms have each been named as producing it, and it is also attributed to a deficiency of bile leading to the formation of biliverdin.

Finally, this disorder in children, whatever form it may take, should never be made light of. Every case should be strictly investigated after it has existed for any length of time. Any kind of diarrhœa must be guarded against in summer. We must never lose an opportunity of examining the stools. Again, in children, diarrhœa sometimes carries off many noxious materials, and we should reflect on this before prescribing for the case. In all forms the changes found after death largely depend on the length of its existence.

The already thrown-off material must be at once removed from the bowel.

The infantile alimentary canal has been recently very well likened to an ordinary surgical sinus, open at both ends, subject to interruptions here and there, into which sinus is constantly being introduced foreign material in the shape of food. It is constantly under the influence of septic organisms. Its walls are subject to the same conditions as regards rest and irritation, septic fermentation, accumulation of its normal contents and discharges, and their liability to undergo decomposition. Likewise it is subject to many of the same principles of the truest antiseptic treatment—

1. Thorough asepsis and cleanliness.
2. Free drainage.
3. Freedom from irritation, and perfect rest.

These three principles summarise the indications for our treatment of many diseases of the infantile intestine; for since our knowledge of these ailments has increased, our treatment has correspondingly varied, and is now quite different from that formerly in vogue.

DYSPEPTIC DIARRHŒA.[a]

This common affection is frequently neglected until it has existed for a long time or has become alarming. We have seen that it is produced by feeding which is either improper, excessive, irregular or unwholesome, but also that in most cases fermentative changes are present from the toxic effects of bacterial organisms which abound in their food. Violent irritation may also produce it, and the inflammation of a vaccinated arm originated one of the worst cases I have seen.

Dr. Soltau Fenwick, of the Evelina Hospital, lends his authority to emphasise these two facts:—

1st. That diarrhœa is the direct result of bacterial activity which produces abnormal fermentations, and inflammation of the stomach and intestines.

2nd. That the intestinal trouble is primarily dependent on gastric indigestion, and that this must be first set right. Selecting some of the chief attendant characteristics or "symptoms" we observe:—

1. *Restlessness.*—Peevishness, discomfort and fretfulness, wakefulness or irritability.
2. *Abdominal Pain.*—Griping, sometimes severe colic, the child screaming and writhing until the bowels move. It wakes with pain, passes a loose motion, gets quiet

[a] This dyspeptic diarrhœa is variously described in older works under the titles "Muco-enteritis," "Mild intestinal catarrh," "Catarrhal enteritis," "Non-inflammatory diarrhœa," "Mechanical diarrhœa," "Irritative diarrhœa," "Acute intestinal indigestion," and "Simple diarrhœa." The more chronic cases are spoken of by authors as "Chronic entero-colitis," "Chronic catarrhal diarrhœa," "Chronic intestinal catarrh," "Chronic irritative diarrhœa," and "Chronic intestinal indigestion."

after the stool, and, perhaps, falls asleep again. The so-called "lightning contractions" of Henoch.

3. *Frequent Stools.*—They are often grass green, resembling chopped spinach, and slimy. They may be watery, or, at first, normal and merely fæculent, always foul smelling and often very mucoid. Sometimes they are profuse—*e.g.*, ten a day for a child five years old. In one case the motions for eleven consecutive days numbered 3, 11, 15, 10, 13, 17, 7, 3, 1, 1, 3. They usually contain undigested food, and curdy flakes of casein are nearly always present.
4. *Thirst.*—The mouth is dry, and the child will usually drink water freely.
5. "*Facies*" *of Diarrhœa.*—If severe, the mouth of young infants is "pursed" to a round hole as if the child were going to whistle! The eyes are sunken and the skin is cold.

Then there may be vomiting, convulsions, twitching of the hands, sour smell from the mouth, and in severe cases collapse with a depressed fontanelle.

In diagnosis every organ should be examined to exclude other affections, and we should never forget the possibility of there being an intussusception. If there is tenesmus, pain, great urgency, or a fulness in the iliac regions, suspicion must be cast on the case, and the rectum should then be examined with care.

Its duration may be from a few hours to a week or ten days. I have seen it end in very acute dysentery. Intertrigo from excoriation of the nates, and prolapsus recti are troublesome complications, and collapse of the lung is likely to occur, with all the dangers of feeble respiration. This disorder should not end fatally if well treated in a healthy child. Any chronic disease co-existing is most dangerous. For instance, a child of 5 years old, who was under my care

for rheumatoid arthritis which crippled it for three years previously, was suddenly and unaccountably attacked with very bad diarrhœa which could not be arrested, and died in three days. In this case I had an opportunity of examining the bowel afterwards, but I found the entire intestine perfectly normal to the naked eye.

There is no characteristic *post-mortem* change. Those who have recorded fatal cases say many reveal no change at all, while some merely show a streaky ecchymosis here and there. It is natural to expect that during life these cases would present vascular injection of the coats of the bowel, but this, if it does exist, disappears after death.

CHRONIC CASES.—Sometimes a child is brought only after months of diarrhœa and emaciation. It is often popularly said to have "consumption of the bowels." It is sometimes associated with chronic wasting disorders: syphilis, rickets, tubercle, and with whooping-cough or measles. Some cases exhibit after death foreign bodies swallowed by the child, chips of timber, shells, chalk, leaves, currants, &c.; while bad air, dirt, and exposure develop a considerable number. Deficiency of evacuation keeps up the mischief. Foul material lies in perpetual contact with the mucous membranes, and fermentation aggravates the condition.

These cases exhibit a different and more miserable aspect. The following will be observed:—

1. *Emaciation.*—Scarcely any disease wastes a child so much as prolonged and severe diarrhœa. The mother often "does not know why." There is slow wasting, the child growing older, but not larger. It has a pinched, "monkey-like" face, and is stunted in growth, leaving the head only very large. Observe the *neck*. It is very thin. The child has a shrivelled skin, especially noticeable over the adductors of the thighs.

2. *Frequent Stools.*—Three, six, or eight per day. Sometimes many more. They are very offensive and often termed "putrid," having a sour, intolerable stench. Undigested food is passed with coagula of casein; mucus is voided in slime and shreds. They are sometimes large in proportion to food taken, and foreign materials may be seen in the discharge.
3. *Fretfulness.*—The child is nervous, sleepless, restless, and evinces bad temper, constantly "whingeing" or "grizzling" in a miserable manner.
4. *Œdema.*—Sometimes general anasarca is found in severe cases, when the wasting is extreme. It is seen about the ankles, and the heart and kidneys may be perfectly sound.
5. *Pains* of a griping, colicky nature in the abdomen from distension or peristalsis, which latter may be visible, and followed by a loose motion.
6. *Flatulence.*

Then there may be prolapsus recti; appetite sometimes greedy and voracious, and the more it eats the thinner it becomes, as the stools are multiplied. "As soon as food is taken, it goes through it!" "The wasting now proceeds rapidly; the child gets hollow-eyed, wrinkled, and old-looking. His belly swells from flatulent distension. His limbs often become œdematous. He is excessively feeble. The urine is diminished in quantity if the purging is severe, and the child sinks into a state of exhaustion, and dies of asthenia."[a] All the symptoms designated "spurious hydrocephalus" or "hydrocephaloid" disease may be present before death. They signify extreme exhaustion, the child lying insensible, with sunken eyes and irregular breathing.

The most difficult question to answer is—"Is it tubercular disease with ulceration of the bowel?" Tubercle is less fre-

[a] Dr. Eustace Smith.

quent under two years of age, and rare under eighteen months. Tubercular ulceration may be suspected in a child over two years of age in whom diarrhœa is obstinate—there is much wasting, with pain after food; brown, watery, offensive stools, and borborygmi. In abdominal tubercle I have repeatedly noticed a peculiar expression in those cases which have chronic diarrhœa. Jadelot's lines are well marked, the child has a sickly yellowish face, exactly descriptive, to my mind (if you can imagine it), of having been given a "sour emetic." If many cases of abdominal tubercle with diarrhœa are examined, this sour emetic "facies" will be seen in a great number of them. It contrasts wonderfully with the rosy-apple cheeks of many other of these tubercular cases. Tubercle also has frequently a rough skin, with indican in the urine. I have also observed a peculiar tubercular smell on examining these children. It is striking, and is not a fæcal odour. Enlargement of the glands in the groins, axillæ, and triangles of the neck is very strongly in favour of tubercle.

Diarrhœa may, of course, accompany other diseases, which must be sought for—*e.g.*, lardaceous, malignant, splenic, or uræmic conditions.

Frequent relapses and the gradual but continued loss of strength renders the child physiologically bankrupt, and it dies exhausted by the drain on its system. Chronic diarrhœa with ulceration of the bowel is a very favourable condition for the infection of tubercle, the unhealthy individual being unable to resist its attack.

Co-existence of disease renders recovery doubtful. Rickets, syphilis, tubercle, scurvy, or diarrhœal affections in the family are bad. The older the child the better the chance. Œdema signifies a severe case, and collapse is always dangerous.

There is a peculiar appearance often found in the bowel of children dying from diarrhœa—*i.e.*, a slaty-blue or black

dotted condition in large patches. It has the exact appearance of a "shorn beard." It has been attributed to altered blood lying around the minute ulcerations of the solitary glands, and if once seen cannot be forgotten.

There may be also enlargement of the solitary glands with abrasion, or ulceration, or large extensive ulcers. Tubercles may also be seen, but there is no constant change found.

INFECTIVE DIARRHŒA.[a]

This disease, as we have seen, has only lately been understood. It may be taken in a measure as a sanitary index of large towns. Everything points to its bacterial origin, and we can no longer doubt but that it is microbic.

The profound nervous prostration out of proportion to the amount of diarrhœa, and the deaths of many after all discharges have ceased, strongly point to a definite poison. It is, in most cases, directly produced by infected milk. Some of these poisons have been isolated. Dr. Vaughan has separated from poisonous and stale milk a crystalline substance, called by him "tyrotoxicon" (cheese poison). This produces vomiting, purging, collapse, and death in a short time, leaving no change *post mortem* but blanching and softening of the intestinal mucous membrane, precisely similar to the condition found after "choleraic diarrhœa," which this disorder in question is sometimes called. Drs. Vaughan and Booker have also isolated several poisons from cultures derived from the intestines of choleraic infants. Hypodermic injections in kittens, puppies, and guinea pigs speedily produced vomiting, purging, collapse, and death.

[a] This infective diarrhœa is variously described in literature as "Summer diarrhœa," "Milk infection," "Gastro-enteritis," "Gastro-intestinal catarrh," "Inflammatory diarrhœa," "Zymotic diarrhœa," "Epidemic diarrhœa," "Ptomaine poisoning." In its most intense manifestations it is recorded as—"Cholera infantum," "Acute gastro-intestinal catarrh," "Choleraic diarrhœa," "Infantile cholera," "Cholerine," or "Acute milk infection."

The varieties described as summer diarrhœa and cholera infantum are only ones of degree, and great simplicity is obtained by terming them both infective diarrhœa. They are pathologically identical, and the symptoms are due to direct absorption of organic poisons from the stomach or intestine. The line of demarcation between them is indefinite and useless.

This complaint sometimes rages as an epidemic. It practically never occurs in breast-fed children (at least in only three per cent.). Whitla emphatically says, "Sterilised milk is a perfect safeguard against ordinary summer diarrhœa and the more severe cholera infantum." We can understand that it is rarely seen in country districts.

Neglect or deficiency of ventilation seems to be a very important cause, and the bacteria in question appear to inhabit the superficial layers of the earth, becoming widespread when the temperature reaches 58° F.

The symptoms of a severe infective diarrhœa are most remarkable; its severity is appalling. Selecting the five most important we observe :—

1. *Collapse and Stupor.*—There is gradually increasing unconsciousness; the child lies in a drowsy, listless, apathetic state, with half-closed eyes, as if it were dozing or half-asleep. It may be actually comatose or even moribund when seen. The eyes are dull, hollowed, and deeply sunken into the scooped-out orbits, and the cornea is smeared with a mucoid film. This opacity and dimming of the cornea is believed by Henoch to be a fatal sign, its tissue being dried up, and certainly most cases of cholera die. The fontanelle is depressed and hollowed, and, if extreme, the bones of the skull may overlap from the shrinking of its contents. The pulse is small, thready, excessively feeble, and fast, and often we fail to find it, or to count it when perceived. The respiration is shallow and weak, but sometimes resembling

Cheyne-Stokes breathing in the loud exaggerated sigh which is occasionally drawn. The features are much drawn, pinched, and shrunken, the nose being sharpened and the cheeks falling in. They are frequently shrivelled and corpse-like. The face is faintly livid and old-looking, and the dark shadow round the sunken eyes, with the pallid, earthy complexion, gives the child a deathly cadaverous appearance. The skin is clammy and the extremities very cold. It is possible that this condition may be mistaken for cerebral effusion, but they are very different. This collapse from severe diarrhœa is strikingly characteristic. It exactly resembles a case that has almost "bled to death." In past years it certainly has been mistaken for cerebral effusion and termed the hydrocephaloid state, but out of a very large number that I have seen and carefully noted, only one in particular has struck me by any very serious resemblance. It was that of a child who had been in bed for some days for summer diarrhœa. It became worse, and instead of finding it awake and fairly bright on visiting it next day it was comatose, breathing irregularly; it had vomited; its eyes were turned up under the lids, and there was a faint flush about the face. Since last seen a casual observer, standing at the foot of the bed, would have said that cerebral effusion had come on.

It is peculiar cases such as this that, no doubt, led to the designations "hydrocephaloid disease," or "spurious hydrocephalus," and to the errors sometimes made in diagnosis, but this collapse from continuous diarrhœa in young infants when once seen can hardly ever be forgotten. The cerebral symptoms are due to the enfeebled circulation in the brain, and the most extreme general debility. To my mind it closely resembles a case that had bled excessively—and in reality it is so—except that the flux has been through the channel of the intestine. A little thought will, therefore, distinguish it from meningitis, since there is—

No ocular paralysis.
No headache.
No rigidity or retraction.
No constipation.
No rise of temperature.
No tension or bulging of the fontanelle.

It is necessary only to mention these to show the extreme difference between the two conditions, and because in past times they have been confounded. This collapse in fatal cases leads on to deeper coma and death, with perhaps a few faint convulsions or twitching of the limbs, and the child's life goes out like a lamp.

2. *Sudden Vomiting.*—At first the contents of the stomach and then watery mucoid fluid.

3. *Purging.*—Sometimes continuing incessantly with the vomiting till the child is profoundly collapsed and dies in a few hours. The motions very quickly pass from ordinary loose fæculent stools to watery serous or rice water discharges. They have a "musty" odour, but are not offensive. They may be very profuse, ten to twenty or more stools being copiously voided in twenty-four hours; often when first seen the diarrhœa has been raging for several days, and the child is brought on account of its collapsed condition. In these cases there may really be no motions when seen by the physician, and it must be recollected that many children will die thus, after the vomiting and purging have ceased. The discharge is almost pure blood-serum, and scarcely stains the napkins, and it is usually devoid of colour.

4. *Thirst.*—This is extreme from the loss of water. The child cannot speak, but lies on its back sucking or tasting its lips, often opening its mouth, expressing its feelings graphically, and greedily swallows spoonfuls of water when given.

5. *Rapid Wasting.*—Scarcely any disease wastes a child so quickly. It is sometimes extreme. There is loss of muscular tone, and flabbiness, the child is perfectly "limp," the soft parts are shrivelled down upon the bones, and the

body is dwindled and shrunken. Wasting is best seen on the inner sides of the thighs. The skin is inelastic and hangs in folds.

Albuminuria is stated by Von Hofsten to be a characteristic symptom, and he states he has observed it in 998 cases. The urine is certainly scanty, so much so indeed that there is difficulty in collecting it.

These children when seen are sometimes so completely collapsed and moribund that a regular physical examination would almost certainly kill them unless very gently conducted, but fortunately the symptoms are evident upon inspection. They are all signs of terrible gastro-intestinal irritation.

The diagnosis can hardly be mistaken. Cerebral effusion may perhaps be simulated by a case now and then in the so-called "hydrocephaloid" condition if it is suddenly sprung upon the practitioner in this state, but they are very distinct. The chief contrasting or opposing conditions are:—

Hydrocephaloid state from Diarrhœa.	*Cerebral Effusion* (as in tubercular meningitis).
Diarrhœa.	Constipation.
No ocular paralysis.	Ocular paralysis and squint.
No rise of temperature.	Slight feverishness.
No headache.	Headache (if old enough to complain).
No tension or bulging of the fontanelle.	Bulging fontanelle.
No rigidity.	Rigidity and retraction in many cases.
No retraction.	

I have seen one case closely simulate acute irritant poisoning, and present many of its signs after death as well.

Another form of "hydrocephaloid" I have seen in older children—about seven years of age—where a child may be brought perfectly collapsed, with headache, vomiting, confined bowels, sensible when roused, but delirious at night. These symptoms strikingly resemble cerebral mischief, but

may all arise suddenly from food-poisoning—an abdominal case closely simulating cerebral effusion.

The great danger is the collapse. The younger the child the graver the case. Evacuation is nature's method of relief, but the child may die during the eliminative process. It frequently dies of the poisoning, and not of the flux.

The prognosis in collapsed cases is exceedingly bad. They almost invariably die. Their life seems to flicker out like a lamp.

The morbid appearances in cholera infantum reveal nothing characteristic and constant.

The following are notes of some *post-mortem* changes which I have found:—

Case.—A. P., was a child of seven months, who had diarrhœa and vomiting for fourteen days. It was quite well till then, and died two hours after I saw it. It had never been breast-fed, but was brought-up on cow's milk and barley water, and the milk was not boiled. No cause was known.

Twenty-six hours after death the body weighed 7 lbs. 12 ozs. Emaciation, rigor mortis just present, cervical glands, pharynx, œsophagus, larynx, trachea, all normal but pale. Bronchi contained considerable quantity of muco-pus. Lungs—a good deal of collapse of edges of both anterior lobes, and a great many patches of milky-white emphysematous lung overlapping and lying on collapsed portions, and raised high from the surface. The right anterior apex showed a triangular piece of brilliant scarlet colour, solid, and full of bright red blood.

The heart was normal, pale. Right and left cavities both contained whitish clots adherent to the musculi papillares, and entering the aorta and pulmonary artery.

The intestines were very small and contracted—might be compared to a bag of worms of a pale purplish colour. Rectum and colon were stained inside of a port wine colour; the whole alimentary canal was absolutely empty. The lower end of the ileum showed a scarlet patch 2 by 2½ inches just above the valve. The jejunum was of a bright golden colour internally, which washed off.

The stomach was contracted and empty, almost dry, and very white and pale.

The liver was normal, ducts free, bile very dark, and not golden like the material seen in jejunum.

The spleen, bladder, kidneys, and suprarenals were normal. The bladder was empty. No tubercle was seen anywhere. The brain was not examined.

There are always signs of terrible collapse in the features, even though the body may be fairly nourished.

In a male child of three months who died from it, twenty-four hours after death an examination revealed—

"Weight 6 lbs., emaciation, a little moisture in the bronchial tubes, with emphysema of the upper portions, and collapse of the bases of both lungs, a clot in the right ventricle of the heart, the dark bluish-black dotted or 'shorn beard' appearance of Peyer's patches, and a little ropy mucus in the stomach." All the other organs perfectly normal.

Again—a female child of seventeen days weighed 6 lbs., was emaciated; there was no rigor mortis; the œsophagus was very red and inflamed in the lower two-thirds; the stomach and duodenum was red and inflamed to an extreme degree (almost suggesting irritant poisoning); the bronchi were also red and inflamed with some muco-pus in the tubes; there was emphysema of the upper and anterior portions of the lungs, with collapse behind, and all the other organs were normal. The foramen ovale was just closed, but obliquely patent still.

TREATMENT OF DIARRHŒA.

In treating diarrhœa in children very distinct objects must be kept in view, and our remedies given on a true scientific basis. Recollect:—Poisoning and fermentation from micro-organisms; indigestible and undigested food with deficient evacuation, and a profuse and dangerous drain of water from the system. The slightest remedy relieves the mild cases, while others are hopelessly incurable in the absence of a suitable antitoxin.

1. General Management.—Keep the child warm; wrap

up the legs and arms in cotton wool; place hot bottles round the child in bed; apply a wool jacket and a flannel binder. This heat is of the first importance. Normally our main loss of heat is through the skin, and the smaller the animal the greater proportion is there of superficial area to body-weight, and therefore the greater the loss. In small children, then, all heat must be preserved, and especially where diarrhœa exists. See that the nurse is scrupulous in her cleanliness. Clean, dry napkins must be constantly at hand and applied; the bed must be level, smooth, and fresh linen put on the moment it is required, and the child should lie in a dry, warm, clean cot, with the cleanest of clothes around it.

Procure all the rest possible. Relieve eruptions, irritations, excoriations, by suitable powders, as oxide and carbonate of zinc, with a little boric acid, or a weak carbolated solution of subacetate of lead. Carefully attend to the mouth. Daily cleansing will be necessary to remove fungi of thrush, if present. Glycerine of borax, diluted peroxide of hydrogen (2 per cent.), or salol in glycerine, are excellent applications.

2. Remove Irritating Particles of Food.—Give a purgative to stop the purging. Nature makes strenuous efforts to perform this herself. In the profound collapse of choleraic cases a purgative is scarcely safe, but no hard and fast rule can be laid down, as it depends on the state of the child's strength. The best drug is castor oil. It affects the stomach and upper portions of the small intestines. There are two ways of giving it. A full dose acts directly as a thorough purge, and clears the bowel; a drachm is quite sufficient for a child 1 year old, and ʒss. for a younger infant. The earlier this is given the better. In chronic attacks 10 to 15 minims given daily, in the mornings, is best for some, if continued for a long time. The second method is to give ♏ 5 every hour. This is very soothing for small children. An extremely useful prescription is:—

℞—Olei Ricini, ♏ 5.
Mucilag. Acaciæ, ♏ 15.
Aquæ Menth. Pip., ad ʒi. Given every hour.

If thought advisable, ♏ 1 of the liquor hydrarg. perchlorid. in each drachm of the castor oil mixture does great good. Olive oil is suitable for very young infants. Fluid magnesia, liquorice powder, Tamar Indien, or elixir of senna, for older children. The syrup of rhubarb also acts well. Another useful mixture is:—

℞—Pulv. Rhei, gr. i.
Sodii Bicarb. gr. ½.
Syrupi Zingiberis, ♏ 8.
Aquæ Menth. Pip., ad ʒi.

The administration of a purge in the collapsed states of severe infective summer diarrhœa, is an extremely serious question. It can be decided only by a thorough grasp and appreciation of the case in point.

3. Diet.—This complaint is a diet disorder, therefore much care is necessary with the food. Milk is not truly a liquid diet, for it solidifies in the stomach. The upper classes and the very low classes frequently do not nurse their children; the middle classes do, for they are neither too fashionable to ignore it, nor have they to labour, and so hand-feed the infant. Undoubtedly, pure fresh milk is best unboiled if the source is known to be pure, but in cities it is, perhaps, safest to boil it before use.

(*a.*) *Change the Milk at once*, except for infants at the breast, who should get nothing else, and this only at regular intervals. The fact that the child has diarrhœa is sufficient proof that the food disagrees. If a wet nurse is employed, the greatest care must be taken in the selection.

(*b.*) *Diluted Milk.*—Equal parts, or ⅔ of pure water, breaks up the curd. Barley-water makes the curd less firm.

Soda-water is excellent if the child will take it; the effervescence smashes up the curd by the bubbles of air. Lime-water, by virtue of its alkalinity, is often used, but if for the express administration of lime it is useless. There is more lime in cows' milk than in lime-water—cow's milk contains 1·51 per cent., and lime-water 0·14 per cent. A few drops of the saccharated solution is best if lime is required medicinally. Plain boiled water is a good diluent, or one ounce each of milk, lime-water, and boiled water.

(*c.*) *Humanised Milk* contains less curd and more cream. The only scientific way of feeding infants artificially is by regulating the percentages of proteids, fats, and sugar. In rough terms we should keep the proteids near 1 per cent.

Cream Milk:—

Milk	-	3 ounces.
Water	-	3 „
Cream	-	1 „ (20 per cent. fat)
Lime-water		1 „
Milk sugar		3 drachms.

Cream milk is specially prepared by the Aylesbury Dairy Co. in London for infants. Equal quantities of cows' milk and a nine per cent. solution of lactose are passed through a separator so arranged that the outgoing streams are equal (cream milk and skim milk.) The cream milk is Pasteurised and supplied in vacuum-stoppered bottles.

Gartner's Milk:—Equal quantities of cow's milk and sterilised water are poured into a centrifugal separator similarly arranged that the outgoing streams are equal. The cream milk thus obtained is an excellent substitute for human milk.

Rotch* has devised 13 scientifically humanised mixtures of

* *Cf.* Dr. Cautley on Infant Feeding. 1897. P. 152.

various compositions suitable from birth to the age of weaning, with definite percentages of proteid, fat, and sugar, for which the Profession is indebted to him.

A simple process is:—Skim the cream off, divide the milk in half, make rennet whey of one half, and mix all three together again, leaving out the curds. This is approximate.

The humanised milk supplied by the Aylesbury Dairy Co. in glass bottles is excellent.

Whey may be given with cream. ʒss. cream to ʒiv. whey, or whey and barley-water, or cream and barley-water in small quantities.

(*d.*) *Peptonised Milk* 2 parts; with water 1 part.

(*e.*) *Condensed Milk* if good is good, but the popular demand is for a sweet milk and not a good milk. The "*Milk-Maid Brand*" (Anglo-Swiss) contains more fat (10·92 per cent.) than others, and is very good. The "*Ideal*" brand is also good. Some brands contain only 0·42 per cent. fat.

(*f.*) *Sterilised Milk.*—This is free from poisonous germs, but may, perhaps, produce scurvy unless mixed with some fresh milk or whey. Sterilisation devitalises milk, but one meal of fresh whey daily will prevent the onset of scurvy. Starr reported 5 cases of scurvy in 1895 in infants fed on sterilised milk. Recovery took place rapidly on unsterilised milk, raw meat-juice, orange juice, and citrate of iron. Some antiscorbutic element is destroyed by boiling the milk, but this danger has been greatly exaggerated. Milk is sterilised by exposure for 20 to 30 minutes to superheated steam. It is easily prepared for infants by "placing it in a china vessel which stands in cold water, the water being then boiled for 15 minutes." This method is devoid of danger of scurvy or constipation, and is, for all practical purposes, sterilised though

not boiled—(Dr. Kingston Barton, *B. M. J.*, Jan. 2, 1897, p. 14.) Professor Whitla advises "milk to be boiled on a water bath in small bottles plugged with sterilised wool for 15 minutes," the bottles to lie in a saturated solution of boric acid. This milk remains good for 5 days.

Sterilised milk and barley-water may be mixed in varied proportions with 10 drops of liquor calcis saccharatus. Numerous sterilisers are in the market:—

Soxhlet's is suitable for home use, and moderately cheap;

Rotch's apparatus is simpler;

Hawksley has 3 kinds; while other apparatus are *Escherich's* (*Lancet*, Feb., 1891), *Starr's*, *Caillé's*, *Siebert's*, *Warner's*, &c.

(*g.*) *Pasteurised Milk* is milk raised to a temperature of 70° C. (158° F.) for half an hour, and then cooled rapidly. This will not render tuberculous milk perfectly innocuous, but will render the milk of a mixed herd safe. Its advantages are—taste and smell are unaltered, microbes present are destroyed, chemically it is not seriously changed, and fermentation is stopped.

(*h.*) *Attend to the Feeding Apparatus.*—A proper feeding bottle should have no tube, no angles, no indentations on glass, a wide mouth. It should be of transparent flint glass, easily cleansed, about 8 oz. in size, and impossible to be used by the child alone. It might also be graduated.

(*i.*) *Eliminate Starch from the Food.*—Bread-jelly, barley-water, rice-water, and Mellin's food seem the least disastrous of these, but they are often inadmissible.

(*j.*) *Stop the Milk altogether* in severe cases. Even whey will ferment.

There are many SUBSTITUTES FOR MILK. Raw meat juice is excellent for children; it is a good antiscorbutic. The scrapings of a rump steak against the grain; or

shred, pounded, sieved, and strained through muslin, may be given, a drachm every 4 or 6 hours, sweetened. Gravy. Gum Arabic in boiled water. White of egg diluted or "albumin water" is the white of an egg cut in various directions with a clean scissors, shaken up in a flask, with a pinch of salt, and 6 ounces of pure cold water, strained through muslin and sweetened. This can be given alone or with mixed milk. Valentine's meat juice; Brand's jelly; veal or chicken tea; white wine whey; plenty of pure fresh water; beef essence; beef pulp; clear soup; chicken jelly; the yolk of egg beaten into an emulsion, with hot water, strained and sweetened; raw meat jelly.

4. Antiseptics *to allay Fermentation.*—Thorough intestinal antisepsis is impractical, for in fully sterilising the bowel we may poison the child. Some antiseptics are strong poisons—*e.g.*, perchloride of mercury, carbolic acid; others are disagreeable, as iodoform, naphthalene, B-naphthol. Some are soluble and act in the stomach and higher intestinal tracts—resorcin, carbolic acid, mercury perchloride, lactic acid, sodium salicylate, &c. Others again are insoluble or decomposed in the intestine into antiseptic substances—calomel, salol, benzol, naphthol, bismuth salicylate. The most useful are:—

Calomel.—Given at once, with or after an initial dose of castor oil, in fractions of a grain frequently. It is of great use. Gr. $\frac{1}{10}$ every $\frac{1}{2}$ hour till 1 gr. has been taken. (In older children, of 5 to 8 years, it might be followed by a saline draught of Apenta water in the purely dyspeptic cases).

Resorcin.—Gr. $\frac{1}{2}$ to gr. 5 is active in the stomach and upper intestinal tract. It is non-irritating, is soluble and sweet. It may be given with glycerine and cinnamon water, and *a carefully regulated dose of tincture of opium*, or with bismuth carbonate and Dover's powder. Bulky powders, however, are inadvisable in young infants. Resorcin should be continued after the diarrhœa has ceased.

Bismuth Salicylate—Gr. 1–3 every 4 hours. Tasteless, not unpleasant. Given abroad with gum arabic, sugar, and distilled water.

Benzol-Naphthol.—Dr. Soltau Fenwick uses up to gr. 30 per day. It is non-poisonous.

Sodium Salicylate.—Gr. 2–4 every 4 hours relieves gastric fermentation.

Hydrarg c. cret.

Liquor Hydrarg. Perchlorid.—m 1 doses.

Glycerine of Carbolic Acid.—m 1 to 4. Often usefully combined with a castor oil mixture.

Naphthalene.—Gr. 1–3.

Glycerine of Borax.—m 30.

Thymol., Listerine, Salol.

Lactic Acid is said by LeSage and Professor Hayem to check green diarrhœa. This is confirmed by others. One drachm of a 2 per cent. solution may be given, or as a drink when mixed in proportions of a drachm to a pint of sweetened water.

5. INTESTINAL IRRIGATION *to eliminate Toxins.* Well worth trying. Out of 200 cases experimented on by Dr. Scokolow to test the efficiency of the ileo-cæcal valve, 130 were in children under one year. Of these 130 the valve was competent in only 27, while in 103 water passed freely through it into the ileum. This is encouraging, as in over three-fourths of the cases the ileum was reached. In older children of from one to twelve years, out of 70 experimented on in only 33, or less than half, did the fluid pass the valve.

It must be a high irrigation of the bowel with a soft rubber catheter from a glass douche-can. First wash out the rectum, and then irrigate with normal saline solution or boric lotion used warm. Slight elevation of the douche-can is sufficient—18 inches. It is carried out in bed, and an India-rubber bed-pan is a great help. A small enema is of

no use. Rectal irrigation is one thing, but intestinal irrigation is quite another.

Washing out the Stomach is vigorously recommended by Dr. Vaughan with grs. 60 of sod. bicarb. in a pint of water at 100° F. Resorcin or boric acid solutions have also been suggested by Continental writers.

6. Sedatives *to allay Excessive or Abnormal Peristalsis.*—The best of these is the dangerous drug *opium.* When carefully given it does no harm. A child of three months old might be given ♏ ¼ of tincture of opium for a dose. A most excellent form is:—

℞—Tinct. Camph. Co., ♏ 1.
Glycerine Acid. Carbolic, ♏ 1.
Olei Ricini, ♏ 5.
Mucilaginis Accaciæ, ♏ 15.
Aquæ Menth. Pip., ad ℥i.—Frequently.

For a child one year old the dose of tinctura camph. co. may be 5 to 10 drops, or of Dover's Powder, gr. ½.

Chlorodyne may also be given if carefully watched. The greatest care must be taken in the prescription of opium, for it is dangerous though useful.

In older children a very useful powder is—

℞—Bismuth. Carb., gr. 3.
Sod. Bicarb., gr. 3.
Pulv. Ipecac. Co., gr. 1.—Sumatur bis die.

We must recollect that if opium allays peristalsis, it also locks up the poison in the intestine.

7. Restoratives *for Collapse.*—Fresh, pure water to drink is strongly indicated. Water is essential to life, and constitutes more than half the entire body-weight. Proportionately the infant requires more than the adult. Frequent drinks of pure fresh-boiled water are urgently needed. If it cannot be given by the mouth, it may be injected warm into the rectum. The loss of water is extreme, and

recollecting the dry condition of the tissues, we only respond to Nature's call when we administer it.

Stimulants are given by some and strongly withheld by others. If indicated brandy or strong coffee are suitable. Camphor, gr. $\frac{1}{4}$ to grs. 2, may be suspended in mucilage with glycerine.

A warm bath, with a tablespoonful of mustard in a muslin bag in it, is advised by Dr. Goodhart, followed by wrapping in hot blankets. I have seen it resuscitate for a time, but death followed afterwards. The fact is we have, for choleraic cases, no effectual remedies.

Subcutaneous injections of horse serum were tried in Germany last year (1896). Out of 15 children injected with from 10 to 20 ccm. under the skin of the thorax, 4 died. One per cent. sterilised saline solution has also been given hypodermically—10 cc. at a time—with a Roux syringe.

PRECAUTIONS AGAINST DIARRHŒA.

Before leaving the subject, it would be omitting a most important thing, did one not allude to the prevention of this disorder.

All these diarrhœas could be prevented by attention to the following methods, and preventive treatment intelligently carried out would save thousands of lives annually in our large cities. The difficulty is in the organisation of these measures; they are:—

(*a.*) *The scientific regulation of artificial feeding*, involving such considerations as:—

The size of the child's stomach; its age and weight.
The quantity to be given at each feed.
The number of meals in 24 hours.
The selection and composition of the best substitutes for human milk.
The method of preparation.

The kind of apparatus.
The temperature of the food.
The manner of administration.
The preservation of the food.
The cleanliness of all apparatus.

(*b.*) *The Purification of the Ground.*—This is within the reach of the Public Health Authorities, and consists of sanitary improvements in overcrowding, ventilation, cleanliness of ashpits, sinks, sewers, disposal of refuse, drains, cleanliness of houses, premises, and yards.

It is from the superficial layers of earth that the poisonous organisms appear to be derived.

(*c.*) *The Purification of Milk.* —A recent writer says—"The management of our milk supply is a disgrace to a nation possessed of a scientific knowledge of the diseases dependent upon it." Our country is a long way behind Denmark in the management of its milk supply. Copenhagen is very well and scientifically supplied by a company. The various processes are carried out at 40° F., and it is supplied to the consumers at this temperature in carefully sterilised bottles sealed with clean new corks.

Some such outlines as the following are involved in this reform, and to ensure a pure milk supply it is suggested—

That cows should be grass-fed on pure pasture only.
That stall-fed cows, if existing, should get green fresh food, and no fermented foods as brewery grains, turnips, or oil cake should be used.
That cows should have a pure water supply.
That they should be kept very clean, groomed, and clipped, and their udders washed before milking.
That they should be periodically and most skilfully examined, and healthy animals only milked.
That sick or condemned animals should be at once removed from dairies.

That each animal should be branded.

That a Government License should in all cases be obtained to sell milk.

That cow-houses should be so constructed that the floors and walls can be washed down with a hose, disinfected, and the yards kept pure.

That no consumptive or other unhealthy people should be permitted to work in dairies.

That milk-cans should be of a regulation size and shape, so as to facilitate thorough cleansing by steaming and scouring, with dome-shaped bottoms, smoothly soldered joints, and easily cleansed taps.

That the milk should be properly cooled down to avoid development of micro-organisms.

That it should be kept in suitable covered vessels till used.

If milk is so delivered to the consumer, summer diarrhœa will, perhaps, seldom occur, and sterilisation will be then unnecessary. It may afterwards, however, be affected in the house by unclean vessels and utensils, places of storage, and surrounding unsanitary conditions.

A Sanitary Order, which is worthy of notice, has recently been made by the Board of Health in Buffalo, N.Y., to the following effect:—

"That it shall be unlawful for any person or persons to use, or to engage in the sale of, any bottle, mechanism, or other device for the artificial feeding or nursing of infants or young children under 3 years of age, which has connected therewith a rubber tube, hose, or such contrivance."

"GASTRIC ATTACKS" OR TOXIC GASTRITIS (FOOD POISONING).

Is there such a disorder in children as "gastric attack?" For many generations practitioners have sought refuge in

this phrase. Experience shows they were not wrong. It undoubtedly exists as an alarming condition variously described as above. Moreover, it is very frequent. Almost every practitioner sees cases of it which at first he cannot diagnosticate. Also it cannot be classified according to the routine diseases of adults. There are few more puzzling conditions in children. They are abdominal cases simulating organic cerebral mischief, or specific fevers. It occurs after errors in feeding. It is a chief cause of much of the haziness and uncertainty and obscurity of some men's knowledge of children's diseases. The child becoming suddenly alarmingly ill to-day, with, perhaps, many symptoms of profound organic nervous or febrile disease, and quickly changing or recovering in 48 hours, remains almost an enigma to the physician. Its presence is only inferable from symptoms. It is said to be slightly more common in spring. Previous attacks are frequent. It is most erratic in its course and duration. It is believed to be an acute inflammation of the glands of the stomach due to irritating food. The symptoms to one suggest acute dyspepsia, to another "gastric fever," to another dentition fever, while to a fourth it may be put down as an enteric, cerebral, or eruptive febrile disease.

Every time the stomach is overloaded with food, especially if indigestible and unsuitable, a speedy natural cure may take place by spontaneous vomiting or diarrhœa. When this does *not* take place the "gastric attack" develops into a "status gastricus sive saburralis," a condition of whose nature we know practically nothing in spite of its frequency.[a]

What the actual condition is we do not know. Its causes are practically always dietetic. The healthiest children may get it. It should never be put down to "cold," for definite demonstrable dietetic causes are always found, and poisonous decomposition of indigestible food is its main origin. It often

[a] Professor Henoch.

follows the eating of tinned meats, tinned vegetables; excessive eating of fruits, cakes, or sweets between meals; bad fish, game, putrid meat, mushrooms, sausages, mussels, tainted milk, pickles, apples, nuts, almonds, fat pork, mackerel, crab, cucumbers, sauces or highly-spiced dishes—or overeating of any kind.

Dr. Soltau Fenwick has observed a lack of hydrochloric acid in the contents of the stomach, leading to micro-organic fermentation and formation of organic acids.

Some elaborate investigators actually describe four or five varieties.

All that is necessary, however, is to distinctly recollect that it may occur WITH OR WITHOUT HIGH FEVER, and may present almost any known symptom.

Selecting the most likely and frequent signs we observe, perhaps, a full-grown child prostrated on its mother's lap by the following urgent and puzzling symptoms, which have suddenly come on:—

1. *Headache.*
2. *Vomiting.*
3. *Confined Bowels.*
4. *Collapse, drowsiness, and apathy.* It may be almost comatose; unable to raise its head; stupefied or partially insensible; cold sweat and weak pulse from cardiac failure.
5. *Delirium*—"night-mare" or bad dreams at night.
6. *Tongue* red and creamy, thickly coated with a yellow felt-like fur.
7. *Swollen, tender belly,* with abdominal discomfort. Then high fever, anorexia, restlessness, or pain, offensive breath, great thirst, perhaps convulsions, or other reflex nervous symptoms combine to form the most alarming picture of what may only be a surfeit or "toxic gastritis" from food poisoning, instead of some gross organic disease.

The most valuable guide is its *sudden onset after food.*

The diagnosis is most difficult. Indigestion does not occur to us at first, for we think it too trivial to produce such alarming symptoms, and one's certainty of opinion is interfered with by the haunting fear that typhoid fever or tubercular meningitis may be brewing. The conditions which confound us in these cases are:—

1. *Tubercular meningitis* in the comatose stage, but this will be known by—

   Ocular paralysis,
   True and deeper coma,
   Tense bulging fontanelle,
   Retraction or rigidity—

   all of which are absent in food poisoning.
2. *Intussusception* will produce similar symptoms, but search should be made for an obscure tumour in the abdomen, mucoid bloody stools, and the rectum should be examined.
3. *Enteric fever* is much more insidious, has less fever, enlarged spleen, less headache, is less sudden, and while lasting a long time has a much-milder train of symptoms
4. *Eruptive fevers* (*especially scarlatina*) will develop their signs in 48 hours, while *tonsillitis* or *diphtheria* is excluded by a careful examination.

There is one comfort, in any case—viz., the prompt use of an emetic. This is the first and best treatment for this condition, while if the diagnosis is mistaken it cannot have any ill effect in the early stages of meningitis or typhoid.

The pathology was hitherto obscure. It is now believed that inflammation of the glands of the stomach exists, also implicating the interstitial tissue, but distension from gases and toxic fermentation are all that we can clinically be sure of. The signs are those of irritant poison. It may last from two hours to five or six days or longer, and it is possible a

child might die from collapse.* The prognosis is usually very favourable.

Treatment.—The sooner the offending material is removed the better. The poison must be got rid of. An emetic should be given at once—a teaspoonful of ipecacuanha wine repeated till vomiting empties the stomach; washing out the stomach in bad cases. A purgative of calomel is then indicated, as—

℞. Calomel - gr. i.
Sod. bicarb. - gr. iij. Every 3 hours.

Or—

℞. Hyd. c. cret. - gr. iij.
Sod. bicarb. - gr. iv.
Pulv. rhei - gr. iv.

℥i. of castor oil or of elixir of senna is also very suitable.

Stop all food for 24 hours; then begin with milk and Vichy, cold Bovril, ice, whey, or light jellies.

During recovery, follow with effervescing alkaline medicines, occasional use of fluid magnesia, or a bitter alkaline tonic for older children.

DYSPEPTIC CONDITIONS.

Functional disturbances of the digestive organs in infancy are invariably due to some error of diet. These are "diet disorders." They are, therefore, mostly due to hand-feeding. Many works in treating of these affections use the word "catarrh," and thereby produce endless confusion in the student's mind. In cordial agreement with Dr. Donkin and Professor Henoch, I believe the less we use the word "catarrh" and the more we think of digestion and absorption the better, and prefer no diagnosis to the theory of gastric catarrh arising idiopathically or by a conveniently

* Professor Henoch has observed a respiratory complication which he terms "asthma dyspepticum."

hypothetical chill. We have here to do, not with a primary disease of the mucous membrane, but with secondary affections which must be regarded as arising from a chemical process in the alimentary canal. We know little of catarrh as a demonstrable condition.

"*Posseting*" is regurgitation into the mouth of surplus milk. Many infants "posset" regularly for the first few months of life, and it is harmless—nay, at times salutary. It is a physiological safety-valve action on the part of the stomach.

At present we do not know the exact capacity of a child's stomach. It is estimated by Dr. Rotch, from experiments on 341 infants, that—

At birth it contains		0·98	ounces.
1 month	„	2·35	„
2 months	„	3·22	„
3 „	„	3·96	„
4 „	„	4·57	„
5 „	„	5·28	„
6 „	„	5·71	„
7 „	„	6·18	„
8 „	„	6·95	„
9 „	„	7·54	„
10 „	„	7·89	„
11 „	„	8·07	„

Hence it is exceedingly easy to overfeed a young child.

The stomach of a new-born infant cannot hold more than a wineglassful without over-distension. Too quick or too large feeding will produce this posseting, which is entirely due to overloading. The stomach empties itself without any effort, or even consciousness, of the child; its vertical position, deficient development of cardiac sphincter, the small fundus, and the small amount of great curvature and its cylindrical form, favour this safety-valve action. If

over-distended, its muscles contract and spasmodically pump up its contents. The small size of the organ is completely forgotten. For the first three months of life it is very little bigger than a Higginson's syringe, and not unlike it in shape.

This regurgitation immediately follows greedy suckling. The stomach possesses a kind of automatic regulating function, and as soon as the pressure reaches a certain point it contracts, and the contents are suddenly shot up the œsophagus. It is a rebellion of Nature against overfeeding; were it not so violent dyspepsia would undoubtedly ensue. There is no retching, no effort, no paleness, languor, or faintness to indicate nausea.

It is, then, absolutely harmless. It requires no treatment other than a warning as to improper, excessive, and too frequent feeding. Mothers' milk requires two hours for its digestion and cows' milk certainly longer; therefore lessen the food at once. Never resort to patent foods until you are absolutely convinced milk or cream mixtures properly and skilfully diluted undoubtedly disagree. There is no question but that cows' milk scientifically mixed is the best substitute for the breast.

Vomiting and Gastric Dyspepsia.—All vomiting must be watched. Among 100 consecutive cases of dyspepsia in infants under twelve months at the Evelina Hospital Dr. Soltau Fenwick reports that 9 were breast-fed entirely, 91 artificially fed. Of these latter 51 received sweet condensed milk, 25 some form of farinaceous food, and 15 pure cows' milk.

Among the 9 breast-fed babies 3 showed diarrhœa, tonsillitis, and influenza in the *mother*, directly co-existent with the dyspepsia of the child. Maternal emotion can undoubtedly affect the infant at the breast. Condensed milks disagree from reckless feeding, and an excess of sugar producing

fermentation. Farinaceous foods cannot be digested in early infancy through inefficient saliva and pancreatic juice, and hence they ferment in the stomach and bowel. Cows' milk disagrees from its excess of proteids and the insoluble character of its curd. It is not mixed scientifically, but at haphazard by ignorant nurses and mothers.

Any undigested food in the stomach may produce vomiting. Reflex vomiting occurs in cerebral cases, the onset of eruptive fevers, pneumonia and whooping-cough, scarlet fever, tonsillitis, enteric fever, or intussusception. The vomiting of indigestion has *regular pulse*, full abdomen, and diarrhœa, while that of brain disease has *irregular* pulse, retracted or scooped-out abdomen, and constipation.

If the contents of the stomach are analysed in these cases of dyspepsia free hydrochloric acid is generally absent, whereas lactic and organic acids are usually present from fermentation, and the food will be found to lie unduly long in the stomach.

These dyspeptic derangements are chemical processes arising from organic and bacterial decomposition of food, and *not* organic structural disease of the tissue of the body. They are fermentative and septic processes arising in the contents of the digestive tube, and are not gross lesions of the tube itself. Of course in time they will induce changes in the mucous membrane, but these are secondary and not primary. If confined to the stomach vomiting and gastric symptoms predominate, but if passing further down the tube the intestinal manifestations are somewhat different, and pain, flatulence, colic, or diarrhœa results. Expulsion of the contents of the stomach effects a natural cure, and the trouble may cease in three or four days.

The dangers are of the vomiting becoming chronic. Little by little the child may become "a juiceless, withered, and wasted thing," with dry, scurfy skin, depressed fontanelle,

and a pinched and "peg-top" face—this progressive wasting ending fatally by collapse, and with hydrocephaloid symptoms. The mucous membrane may become disorganised and atrophied (from what is termed chronic gastro-intestinal catarrh), and the case develop into one of infantile atrophy familiarly known as marasmus, where the alimentary canal may be so deprived of its digestive and assimilative structure and functions as to resemble a simple India-rubber tube.

These cases to the naked eye show little or no disease, but microscopic examination may reveal atrophy of the beautiful glandular structure of the mucous membrane of the tube.

Pain, Flatulence, and Colic.—These are the manifestations of the dyspeptic fermentative conditions we have spoken of arising in the intestine, isolated, perhaps, in some central coil, and many feet distant from either orifice, expulsion through which alone constitutes the immediate cure. There may be neither vomiting nor diarrhœa, the other aperture, the pent-up gases and fermenting materials being confined in the bowel. There is in these infants, then, fretfulness and irritability, pain causing the child to writhe in agony, with violent fits of screaming, twitching of the face frowning, turning up, rotating, or fixing the eyes, muscular contortions of the body, with the knees drawn up, soles inverted, and fingers clenched on the thumbs, a pale, agonised, sweat-bedewed face, or sudden and alarming convulsive trembling of the arms and legs, termed by Professor Henoch "lightning contractions," which abruptly cease on the discharge of flatus or other matter from the bowels. These tonic muscular spasms coincident with the pain are well known and not inaptly termed by nurse "inward convulsions"

If inquiry is made, the cause will be found in errors of diet. A baby of six or eight weeks will be found to be getting perhaps cows' milk unskilfully mixed, it may indeed

be pure, or, worse still, some patent starchy food instead of its mother's milk, or a properly-proportioned cream mixture, or other scientific substitute, for the first nine months of its life.

The *Treatment* of these dyspeptic conditions is mainly dietetic. First empty the alimentary canal by an *emetic*—3i of ipecacuanha wine, or grs. 5 of powdered ipecacuanha repeated frequently will give relief. Follow this by castor-oil as a purge, or calomel gr. $\frac{1}{6}$ every hour or two. When the bowels have been emptied a castor-oil mixture in severe cases is useful in 5 minim doses, with mucilage and peppermint-water. Bismuth is also taken well.

Guard against overfeeding; lessen the amount of food. If possible confine the child to the breast; if not, correct the wrong feeding at once. Give very dilute milk, scientifically resembling human milk. A reference to the following tables will guide us in the correct strength of the substitute:—

—	Human Milk	Cows' Milk	Infants' "Cream Milk," made by Aylesbury Dairy Co.	Rotch's Artificial Mixture. F.
Water - -	87·46	87	—	—
Solids - -	12·54	13	—	—
Proteids -	1·93	4·06	1·82	1·50
Fat - -	3·62	3·70	3·7	3·50
Lactose -	6·75	4·48	6·88	6·50
Salts - -	0·24	0·76	0·39	—
Reaction - -	Amphoterous	Acid	—	—

The standard of human milk is an average deduced from the analyses of Luff (for Cheadle), Meigs, Leeds, and König.

The cows' milk is Dr. Cautley's average of London milk as it reaches the consumer.

The "cream milk" made by the Aylesbury Dairy Co. specially for infants is manufactured as follows:—Equal quantities of mixed cows' milk and of a nine per cent. solution of milk sugar are passed through a separator so arranged that the outgoing streams are equal. The "cream milk" is very like human milk in composition, and has been used at the Belgrave Hospital for Children. It is rendered faintly alkaline, Pasteurised, and sold in vacuum-stoppered bottles.

Rotch's F. mixture is one of 13 such devised by him for different states and ages. This one most closely resembles human milk, and is artificially made as follows:—

Cream - - -	7 ounces.
Milk - - -	1 „
Lime-water - - -	1 „
Water - - -	11 „
Milk sugar - - -	500 grains.

Dr. Cautley recommends[a]:—

Milk - - -	3 ounces.
Water - - -	3 „
Cream - - -	1 „
Lime-water - - -	1 „
Milk sugar - - -	3 drachms.

This might be conveniently recollected as—a wineglassful each of milk and water, a tablespoonful each of cream and lime-water, and one lump of sugar.

Painful Colic may be relieved by hot stupes, a light mustard poultice, warm bath and hot blanket, gentle friction over abdomen, and a teaspoonful either of peppermint-water, dill-water, or half a drachm of chloroform water. Sal volatile, brandy, and syrup of ginger suggest themselves pending the

[a] Feeding of Infants. Pp. 144 and 152.

operation of the purgative. Washing out the stomach if necessary.

Convulsions may, in addition, demand a mustard bath, and a chloral and bromide enema.

Dr. Craig said that the ætiology of the disease seemed to be marked by a classification which was arrived at by ascertaining the cause of the disease. One cause of the disease was dyspepsia, and another cause, in a great majority of cases, was infection from milk. Therefore an elaborate classification was not needed.

Dr. W. G. Smith considered the subject a most important one. The small intestine, he said, was the chief seat of digestive processes in adults as well as in children. The stomach was a comparatively small digestive chamber, and prepared the food for the small intestine. He agreed with Dr. Symes in saying that chemical changes were produced by micro-organisms in the small intestine. From a practical point in therapeutics, the treatment of diseases in the alimentary canal might be based on — first, sensory impressions, such as pain; secondly, the chemical nature of the contents of the intestine; and thirdly, the movements of the intestine. It was agreed that the chyme, as it passed out of the stomach in an acid condition, maintained its average acidity down to the ileo-cæcal valve. The contents of the small intestine were never alkaline, and generally acid. Carbonate of sodium was prescribed to prevent hyper-acidity in the small intestine. The main causes of bad effects in children were over-feeding and direct poisoning. It was necessary to regulate the amount of carbo-hydrate in the food of children, as an injurious overplus of acidity resulted from improper carbo-hydrate. Fresh milk, he stated, gave an amphoteric reaction, due to the fact that milk always contained a mixture of mono- and di-phosphate of sodium.

Dr. Symes thanked those present for their kind attention to his paper. Diarrhœa, he said, was a most fatal condition in young children. With regard to Dr. Craig's remarks about a classification, he said that one advantage from such was that simplicity was arrived at.

ANGINA PECTORIS.

By JOHN KNOTT, M.A., M.D., Ch.B. (Univ. Dubl.);
Diplomate in State Medicine (Univ. Dubl.);
Member of the Royal College of Physicians in Ireland.

[Read in the Medical Section, April 9, 1897.]

"In spite of the numerous publications which treat of angina pectoris, the history of that complaint is not very satisfactorily known; and the various opinions which have been expressed as to its nature have thrown so little light on the subject that I wish, in my turn, to communicate to you my views concerning this singular neuralgia." This introductory sentence is *not* original; it forms the opening paragraph of the New Sydenham Society's version of Trousseau's lecture on the subject. Following the inspiring example of one of the most graphic delineators of clinical symptoms known in the annals of the literature of medicine, I propose to contribute my small mite to the general fund of the knowledge of an interesting and, still, obscure condition.

I have seen one hospital case (as a student); two of his paroxysms occurred in my presence. I have also seen another hospital case since, but had no opportunity of observing his symptoms. I have been consulted, at long intervals, by three (male) patients, all of whom described the symptoms of angina pectoris with admirable fidelity; two of these were, however, country residents, each of whom I saw but a few times, and never in a paroxysm; the third lived in Dublin, and I saw him in several of the attacks; but I lost sight of him in a short time, because, although I had given him considerable relief, I could not promise him a perfect cure, so he wished to try his fortune elsewhere.

The case from which I have derived most of my personal experience occurred in the person of a lady whom I had under daily observation for over seven months. Her symptoms—forming, as they did, a very typical specimen of the comparatively rare group of phenomena that are usually denoted by the term which forms the title of this paper—may not, I hope, be found unworthy of a few minutes' attention from the Fellows and Members of the Medical Section of the Royal Academy of Medicine in Ireland.

Case.—The patient referred to was (according to her own account), when she first consulted me, in the seventy-eighth year of her age; she was tall and stately in her demeanour, with very pronounced sharply-cut features—one of which was a very prominent aquiline nose. Her voice was decidedly harsh and unsympathetic. She was of English birth, of good family, had always lived in affluence, and had always been an extremely active—restlessly active—woman. She was a widow—had been so for a good many years; had had a numerous family, most of whom had died after reaching adult life. The death of one, which had occurred but a few years before, had probably given her as much sorrow as she was capable of feeling, for he was her special favourite.

She had suffered from no very special illness during the period of her memory till about three years before she consulted me, when, as she told me, she had been dreadfully tortured for fifteen weeks by very severe intermittent pains in the upper part of the front of the chest on the left side. The diagnosis had been "acute muscular rheumatism," and the treatment was carried out by the local application of liniments and the internal administration of medicines. Neither had ever given her the slightest relief. Her present trouble had commenced one forenoon when, as she returned from the transaction of some marketing business, she was suddenly seized, while ascending an incline to her residence, with intense pain in the front of the chest, and extending to the left side. The attack brought her to an immediate stand-still; the pain soon subsided, and she walked very cautiously to the next lamp-post, and supported herself by it with her arms raised, which was the position which she instinctively adopted. There was a fear of return on moving, which disappeared

in two or three minutes, and she then cautiously went to her house, and had no further trouble of that kind for the rest of that day. But, on the succeeding days, she was always seized—sometimes two or three times—when making some sudden exertion or involved in some fuss; and the attacks lasted a considerable time, up to half an hour or more.

On the day of my first visit—the fourth from the first seizure—she had had a very severe paroxysm, and described it to me very graphically. The onset was always instantaneous; she felt a sudden constricting sensation, of the most excruciatingly painful kind, in the precordial and mid-sternal regions. She emphatically indicated the exact mid-point of the junction between the first and second pieces of the breast-bone as the focus of most intense torture. The pain was described as crushing and grinding in character—it rapidly girdled the chest about the level of the mammillæ, formed another special centre in the left infraclavicular fossa, from which it passed towards the shoulder-joint. In the worst paroxysms it radiated in all directions—around the whole chest, upwards to the infraclavicular fossæ, from which it passed under the collar-bones to the sides and back of the neck, and even to the sub-occipital region; it fastened on the middle of the chin with intense force—"compressing it as in a vice;" it passed also downwards to the hypochondriac regions, to the inguinal areas, and even below the groins to the front and inside of the thighs; it passed laterally to the shoulder of each side, and passed down the inside of the arm as far as the finger-tips—observing in this course, pretty accurately, the distribution of the ulnar nerves.

In the milder attacks the left arm only was affected, in addition to the focal affections of the mid-sternum, præcordia, and left infraclavicular fossa. The pain passed up from the præcordia to the subclavicular region, and outwards towards the shoulder; the position of the bicipital groove was often indicated as a seat of peculiar torture. Thence it passed down on the inner side of the limb, towards the elbow; and, in the milder attacks, it frequently ended about the position of the internal epicondyle, into the upper side of the base of which the sensation of the driving-in of a nail was felt during the paroxysms. But in the severer ones, the lightning pain always passed down to the little and ring fingers, and the sufferer was able to indicate with remarkable clearness the distribution of the terminal branches of the ulnar nerve.

A point that very specially interested me in the very vivid descriptions of symptoms which I received day after day in this case was that in the worst paroxysms she frequently noticed that the pain commenced at the periphery—ulnar side of left little finger, or (less frequently) upper side of base of left internal epicondyle—and, after one or two warning tingles, shot up to the shoulder and inwards to the mid-sternal and præcordial areas.

The next feature of the history which specially interested me was one which I only discovered after I had seen my patient a good many times—it was that her former attack of "muscular rheumatism" was similar in all its features to her present complaint. She had been reticent about it—I think because the treatment adopted had no effect, and her principal medical attendant on that occasion was a relative of her own. During the attacks, as she frequently described to me afterwards, she often went on her knees on the drawing-room hearth-rug, and remained in that position for over two hours, with her head bowed down and her hands to the front of her chest, and the cold sweat dropping from her brow; all the time fearing to move or draw a deep breath, lest her torture should be increased, and feeling that any increase of it must extinguish life.

I also ascertained that the first paroxysm from which she had ever suffered occurred in bed—about 6 a.m. I could not get any clue to an exciting cause. For many years she had been a comparatively bad sleeper; and the general restlessness of her disposition served to make that a more serious predisposing cause of almost any conceivable neurosis than it might have proved in most other persons.

The breathing, heart's action, and pulse were perfectly regular, and continued so throughout. I often hastily examined the pulse and chest during a paroxysm, and can say positively that there was never any pronounced effect

on either the cardiac action or the respiration—more than would necessarily accompany the constrained position which was instinctively adopted, and the fear of moving—especially of expanding the chest—lest the pain should be increased. The breathing was necessarily shallow, but air entered everywhere, and the pulse and heart's action were slightly accelerated—nothing more.

I suspected, of course, atheroma; but could make out no evidence—the superficial arteries displayed no marked tortuosity or rigidity—in fact, considering the advanced age of the patient, there was a conspicuous absence of such phenomena; and, as there was no superfluous fat anywhere, there was special facility for examining them. I tried, over and over again, to discover an aortic aneurysm, but failed. Then there was no other pressure symptom that I could make out. Her peculiarly raucous voice made me think of reflex laryngeal stimulation from such a source, but I ascertained from friends of over twenty years' standing that it had always been "like that." But I must mention here that during the last week or so of her life she spat up, without coughing, a little red blood from time to time.

The severer paroxysms—two of the days preceding my visit, and most of those of the former date—lasted up to about two and a half or three hours. I immediately procured a stock of nitrite of amyl capsules, and gave her directions how to use them; this she continued to do during the remainder of her life. This remedy never failed to relieve and cut short the paroxysm—less rapidly, however, as the case grew older; and instead of one capsule sufficing, as it used to do at first, she was in time brought to use as many as three before the desired effect was obtained. I gave iron and digitalis in mixture—they seemed to have a good effect: the heart showed no symptoms of actual failure throughout. The compound camphor liniment of

the B. P. was rubbed in over the specially affected parts of the chest for ten minutes, morning and evening. Sulphonal tabloids (Burroughs, Wellcome & Co.) were given to procure sleep. They did succeed in giving sleep, without any compromising results; but no medicinal or moral suasion that I could bring to bear upon the case seemed to give any hope of rest during the day. She was never easy or comfortable herself, and seemed to be specially anxious that nobody in her vicinity should be either. I hesitated for some days to tell her that the great danger of over-exertion or worry in such a case as hers was the occurrence of *sudden death*; but when I felt constrained at last to communicate this intelligence, she gave me to understand that she considered she would be better prepared to meet her Maker by continuing the active discharge of her duties in this world so long as she was at all able to do so. She naturally soon got tired of every medicine I tried. She struck against the nitrite of amyl capsules for a few days: but that experiment was a dead failure; the paroxysms, in the absence of the accustomed remedy, and in presence of the highest degree of mental combativeness, returned again and again with tremendous force—often three or four in a day, and in less than a week convinced her that it was better upon the whole to follow my suggestions. She never tried to give them up after that. During this interregnum I induced her to try the effect of the trinitrin tabloids, but they appeared to have no effect whatever. I often changed the iron and digitalis mixture for something else, but always went back to it after a time. In the intervals I gave her such medicines as belladonna, cannabis indica, stramonium, and valerian. During the time that the two last were taken in combination the paroxysms certainly appeared to be less frequent than at other times. I was always, however, obliged to change the mixture after the third bottle. I induced her to take

morphin tabloids—and I had a good deal of trouble in doing it, for she did not like the idea of accustoming herself to the use of that drug—and I must say that for her general condition it seemed to do her more good than anything else I tried. She was less restless in her movements, and less emphatic in the expression of her opinions when taking morphin, and I fully believe that it lengthened her life. I advised her to treat herself generously in the way of the use of the best wines and the most carefully selected diet. She began to take some champagne, but did not continue the regular use of even it long.

I should mention that the close of the paroxysms were followed by the copious flow of urine and gaseous eructations, which are so frequently described as characteristic of this affection. The intense fear of impending dissolution, which some authorities have professed to regard as an essential feature of true angina, can hardly be said to have existed in a pronounced form in this case.

Before I proceed further in any remarks on this rather uncommon affection, I will quote in full the original description of the first sponsor of *Angina Pectoris*. It is short; and, if even only as a specimen of clinical word-painting, well merits the trouble of perusal:—

"There is a disorder of the breast, marked with strong and peculiar symptoms, considerable for the kind of danger belonging to it, and not extremely rare, of which I do not recollect any mention among medical authors. The seat of it, and sense of strangling and anxiety with which it is attended, may make it not improperly be called Angina Pectoris.

"Those who are afflicted with it are seized while they are walking, and more particularly when they walk soon after eating, with a painful and most disagreeable sensation in the breast, which seems as if it would take their life away if it

were to increase or to continue: the moment they stand still all the uneasiness vanishes. In all other respects the patients are, at the beginning of this disorder, perfectly well, and in particular have no shortness of breath, from which it is totally different.

"After it has continued some months, it will not cease so instantaneously upon standing still; and it will come on, not only when the persons are walking, but when they are lying down, and oblige them to rise up out of their beds every night for many months together; and in one or two very inveterate cases it has been brought on by the motion of a horse or a carriage, and even by swallowing, coughing, going to stool, or speaking, or by any disturbance of mind. I have heard one, and only one, person say that he had known it attack him while he was up and standing still, or sitting. But most whom I have seen have been perfectly unaffected with riding in any manner, with speaking, swallowing, laughing, sneezing, or vomiting. One has told me that this complaint was greatest in winter; another, that it was aggravated by warm weather: in the rest, the seasons were not suspected of making any difference.

"I have observed something like this affection of the breast in one woman who was paralytic, and have heard one or two young men complain of it in a slight degree; but all the rest, whom I have seen, were men, and almost all above fifty years old, and most of them with a short neck, and inclined to be fat.

"When a fit of this sort comes on by walking, its duration is very short, as it goes off almost immediately upon stopping. If it comes on in the night, it will last an hour or two; and I have met with one, in whom it once continued for several days, during all which time the patient seemed to be in imminent danger of death.

"When I first took notice of this distemper, and could find

no satisfaction from books, I consulted an able physician of long experience, who told me that he had known several ill of it, and that all of them had died suddenly. This observation I have reason to think is generally true of such patients, having known six of them, for whom I had been consulted, die in this manner, and more, perhaps, may have experienced the same death, which I had no opportunity of knowing. But though the natural tendency of this illness be to kill the patients suddenly, yet, unless it have a power of preserving from all other ills, it will easily be believed, that some of them, who are afflicted with it, may die in a different manner, since this disorder will last, as I have known it, more than once, near twenty years, and most usually attacks only those who are above fifty years of age. I have accordingly observed one who sunk under a lingering illness of a different nature.

"The os sterni is usually pointed to as the seat of this malady, but it seems sometimes as if it was under the lower part of it, and at other times under the middle or upper part, but always inclining more to the left side, and sometimes there is joined with it pain about the middle of the left arm. What the particular mischief is, which is referred to these different parts of the sternum, is not easy to guess, and I have had no opportunity of knowing with certainty. It may be a strong cramp, or an ulcer, or possibly both.

"The opinion of its being a convulsion of the part affected will readily present itself to any one who considers the sudden manner of its coming on and going off; the long intervals of perfect ease; the relief afforded by wine and spirituous cordials; the influence which passionate affections of the mind have over it; the ease which comes from varying the position of the head and shoulders, by straitening the vertebræ of the thorax, or by bending them a little backwards or forwards; the number of years which it will

continue without otherwise disordering the health; its generally bearing so well the motion of a horse or carriage, which circumstance often distinguishes spasmodic pains from those which arise from ulcers; and lastly, its coming on in certain patients at night, just after the first sleep, at which time the incubus, convulsive asthmas, numbnesses, epilepsies, hypocondriac languor, and other ills justly attributed to the disturbed functions of the nerves, are peculiarly apt either to return or to be aggravated.

"The pulse is, at least sometimes, not disturbed by this pain, and consequently the heart is not affected by it, which I have had an opportunity of knowing by feeling the pulse during the paroxysm, but I have never had it in my power to see anyone opened who had died of it, the sudden death of the patients adding so much to the common difficulties of making such an enquiry, that most of these, with whose cases I had been acquainted, were buried before I had heard that they were dead.

"But though it be most probable that a strong spasm be the true cause of the disorder, yet there is some reason for thinking that it is sometimes accompanied with an ulcer, and may partly proceed from it, for I have seen two of these patients who often used to spit up blood and purulent matter, one of whom constantly asserted that he felt it come from the seat of the disorder. Another had no painful sensation in swallowing, and upon pressing the part, which seemed to be affected. From a fourth, who fell down dead without any notice, there immediately arose such an offensive smell as made all who happened to be present judge that some foul ulcer had just then broken.

"Bleeding, vomits, and other evacuations have not appeared to me to do any good. Wine and cordials taken at going to bed will prevent, or weaken, the night fits; but nothing does this so effectually as opiates. Ten, fifteen, or

twenty drops of tinctura thebäicæ taken at lying down will enable them to keep their beds till morning, who had been forced to rise, and sit up two or three times every night, for many months. Such a quantity, or a greater, might safely be continued, as long as it is required; and this relief afforded by opium may be added to the arguments, which prove these fits to be of the convulsive kind. Time and attention will, undoubtedly, discover more helps against this teazing and dangerous ailment; but it is not to be expected that much can have been done towards establishing the method of cure for a distemper hitherto so unnoticed that it has not yet, as far as I know, found a place or a name in the history of diseases."

To the subsequent account of this complaint which Heberden included in his "Commentaries on the History and Cure of Diseases," the following note is appended:— "Cælius Aurelianus, as far as I know, is the only ancient writer who has noticed this complaint, and he but slightly: 'Erasistratus memorat paralyseos genus, et *paradoxon* appellat, quo ambulantes repente sistuntur, ut ambulare non possint, et tum rursum ambulare sinuntur.'" Other descriptions of the more prominent features of the clinical entity now universally known as angina pectoris have since been exhumed by other explorers in this department of medical literature. Parry ("An Inquiry into the Symptoms and Causes of the Syncope Anginosa, commonly called Angina Pectoris") has quoted Seneca's description of his own symptoms; and Professor Osler, of the Johns Hopkins University, Baltimore, has reproduced the translation given by Parry of a part of the forcible account of his sufferings which was given by the Roman philosopher: "The attack is very short and like a storm. It usually ends within an hour. I have undergone all bodily infirmities and dangers; but none appears to me more grievous. Why not? Because

to have any other malady is only to be sick; to have this is to be dying." To this very vivid statement of the intensity of his sufferings Seneca adds that his physicians called the disease from which he suffered a *meditatio mortis*. Forbes and Gairdner regard this case as one of true angina pectoris, although Parry did not.

A still more indisputable case is to be found portrayed in that vast clinical mine of symptomatology and morbid anatomy, the *De Sedibus et Causis Morborum per Anatomen indagatis* of Morgagni. (*Lib. II. Epist. XXVI.*):—

Materfamilias duos & quadraginta annos nata, diu valetudinaria, diuque obnoxia vixerat paroxysmo cuidam ad hunc modum se habenti. A concitatis corporis motibus ingruebat molestus quidam angor intra superiorem thoracis sinistram partem, cum spirandi difficultate, & sinistri brachii stupore: quæ omnia ubi motus illi cessarent, facile remittebant. Ea igitur mulier cum circa medium Octobrem A. 1707. Venetiis in continentem trajecta, rheda veheretur, lætoque esset animo, ecce tibi ille idem paroxysmus: quo correpta, & mori se, ajens, ibi repente mortua est. Cadaver in urbem vectum, cum postridie a notis inspiceretur, . . Cor potius magnum, & durum valde, ac robustum. Aorta ad curvaturam non parum dilatata, justa alibi in trunco, ramisque majoribus latitudine. Sed intus, ubicunque incideres, hic illic inæqualis, nec sine osseis perfectis squamulis, nedum crebris inchoatarum indiciis. Quæ cum videremus; universum truncum, majoresque ramos aperuimus: in illoque ab ipsa origine pone Semilunares valvulas, quæ duræ hic illic erant, et cum futuri ossis initus ad Iliacas usque arterias descripta vitia animadvertimus. Per has tamen, perque alias, etiam superiores, ac nominatim Subclaviam sinistram minime propagabantur, si primam excipias alterius illius, arteriæ partem, quæ Carotidi, & Subclaviæ dexteris originem præbet. Hinc oculos ad cor

referentes, & ad cetera quæ ipsi annexa sunt, vasa, nihil usquam conspeximus vitii, nisi quod Pulmonaris venæ caudex paulo visus est æquo major. In hoc, & in adjecto ventriculo sanguis erat paucus, isque, ut aliis omnibus in locis, niger et omnino fluidus. Sed in Pulmonaris arteriæ trunco non paucus; quanquam in ventriculo dextero, ejusque auricula nullus, facile quia per venam Cavam, paulo ante infra jecur incisam, defluxerat. . . ."

There can be no second opinion, I think, of the genuineness of the group of symptoms here given, and of the value of the description of the state of the vascular system which is so usually found associated therewith. The following case I also regard as one of true angina:—

N. Ferrarinius, Sacerdos Veronensis, qui olim Venetiis phthisicus fuerat judicatus, Patavii autem ante decem annos hemicrania laboraverat, nunc anno exacto quadragesimo tertio, canutus, facie interdum nimis rubicunda, gracili corporis habitu, nec tamen macilento, etsi alacer ad actiones, lætusque videbatur, gravibus quas dissimulabat, curis vir alioquin ad iram pronus, valde anxius erat: queri autem solebat de quibusdam intra thoracem doloribus, quorum sedem manu sterno imposita designabat. Quin pridie se non bene habere, Chirurgo dixerat, ideoque remediis uti quam primum velle opportuno illo anni tempore; erat autem mensis ille Majus quo Tita, atque alii in hac urbe repente obierant; quamvis tempestate sicca, et calida facta; nonus jam esset dies ex quo id acciderat nemini. Cænatus est tamen cum hospitibus hilariter; sed intra modum: nec sane, seu copiam, seu qualitatem attendas, peccare in cibis, aut potionibus consueverat. At summo insequenti mane in lecto mortuus inventus est, supinus, habitu dormientis, sine ulla ad os spuma, tantum brachiis adeo rigidis, ut sine vi diduci non posse, viderim, cum antequam advesperasceret domum ejus venissem cum Collegis

meis Professoribus Medicinæ Primariis. Cadaveris facies, & cervices, & dorsum, & latera ex subrurbro livebant. . .

"In Pulmonibus, excepta sanguinis copia nihil fuit quod adnotaremus. In pericardio nil ferme humoris. In cordis ventriculo dextro polyposa concretio. Tricuspidum valvularum fibrillis ex parte implicita, tres aut quatuor digitos longa, sesquidigitum lata, structura valde compacta; ut qui polypos facile ponunt, hanc pro polypo ante mortem genito habere potuissent. Cum ea sanguis ater semiconcretus, qualis et in proxima auricula. In ventriculo sinistro sanguis minus coagulatus, pauciorque. Ejus columnæ quasi inflammatæ, Semilunares valvulæ paulo quam æquum esset, duriores. Arteriæ Magnæ truncus a corde ad eum usque locum unde incipit descendere, exterius quidem facie inæquali non secus ac si in tuberum modum quadantenus hic illic assurgeret: sed interius toto eo spatio nihil, nisi superficies rugosa, vix duobus locis, iisque exiguis indicia necdum maturæ ossificationis: cætera per dorsum, et in cunctis ascendentibus ramis naturali superficie."—(*Lib. I., Epist. IV.*)

A curiously interesting item in the early literary history of angina pectoris is the fact that the perusal of Dr. Heberden's original description of this symptom-group elicited a letter to him on the subject, which, as Professor Osler truly observes, contains one of the best descriptions of the condition. Heberden's first communication on the subject was read at the College of Physicians (London), July 21, 1768. On November 17, 1772, he read another paper on the same subject, the commencing portion of which forms, perhaps, the most instructive contribution which has hitherto been made to the now voluminous literature of this subject. It opens as follows:—

"Soon after the publication of the second volume of the Medical Transactions I received the following anonymous letter:—

"'SIR,—Seeing among the extracts from the Medical Transactions in the *Critical Review* of last month, your account of a disorder, which you term the *angina pectoris*, I found it so exactly corresponds with what I have experienced of late years, that it determined me to give you such particulars as I can recollect at those times to have felt, more especially as some sensations have frequently led me to think that I should meet with a sudden death. I am now in the fifty-second year of my age, of a middling size, of a strong constitution, a short neck, and rather inclining to be fat. My pulsations at a medium are about 80 in a minute; the extremes, when in a perfect state of health, beyond which I scarcely ever knew them, 72 and 90. I have enjoyed from my state of childhood so happy a state of health as never to have wanted, nor taken, a dose of physic of any kind for more than twenty years. As well as I can recollect, it is about five or six years since that I first felt the disorder which you treat of; it always attacked me when walking, and always after dinner or in the evening. I never then felt it in a morning, nor when sitting, nor in bed. I never ride, and seldom use a coach, but it never affected me in one. The first symptom is a pretty full pain in my left arm a little above the elbow; and in perhaps half a minute it spreads across the left side of my breast, and produces either a little faintness, or a thickness in my breathing; at least I imagined so, but the pain generally obliges me to stop. At first, as you observe, it went off instantaneously, but of late by degrees; and if, through impatience to wait its leaving me entirely, I resumed my walk, the pain returned. I have frequently, when in company, borne the pain, and continued my pace without indulging it; at which times it has lasted from five to perhaps ten minutes, and then gone off, as well as I can recollect, rather suddenly, as it came on, than

lessening gradually. Sometimes I have felt it once a week; other times a fortnight, a month, or a longer time, may elapse without its once attacking me; but, I think, I am more subject to it in the winter than inthe summer months. As, when the pain left me, I had no traces of having the least disorder within me of any kind, either from spitting blood, or any corrupted matter, nor ever entertained the least thought of any abscess being formed, I never troubled myself much about the cause of it, but attributed it to an obstruction in the circulation, or a species of the rheumatism. I shall now proceed to acquaint you with those sensations which to me seem to indicate a sudden death, but which, not being concomitant with the above-mentioned disorder, I am ignorant whether they are to be attributed to it or not. I have often felt, when sitting, standing, and at times in my bed, what I can best express by calling it an universal pause within me of the operations of nature for perhaps three or four seconds; and when she has resumed her functions, I felt a shock at the heart, like that which one would feel from a small weight being fastened to a string to some part of the body, and falling from the table to within a few inches of the floor. At times it will return two or three times in half an hour; at other times not once a week; and sometimes I do not feel it for a long time; and I think I have been less subject to it for a year past than for several former ones. As you have mentioned several, who within your own knowledge have died suddenly, that were troubled with the *angina pectoris*, I suspect they were subject to what I have delineated, as I think that much more likely to occasion a sudden death than either of the causes to which you attribute it. But, be the cause what it may, if it please God to take me away suddenly, I have left directions in my will to send an account of my death to you, with a permission for you to

order such an examination of my body as will show the cause of it; and, perhaps, tend at the same time to a discovery of the origin of that disorder, which is the subject of this letter, and be productive of means to counteract and remove it.

"'I am, sir, yours,

"'UNKNOWN.'"

Another extraordinary coincidence in the history of this interesting case is then given by Dr. Heberden:—"In less than three weeks after he had sent this letter I was informed that in the midst of a walk, which he was taking after dinner, he leaned against a post, and begged a passenger to assist him, by whose help he reached a neighbouring house, where he vomited much and was bled, but died in less than half an hour." The *post-mortem* examination was made by the great John Hunter at the request of Dr. Heberden. "But, upon the most careful examination, no manifest cause of his death could be discovered . . . the heart with its vessels and valves were all found to be in a natural condition, except some few specks of a beginning ossification upon the aorta. . . . The left ventricle of the heart was remarkably strong and thick, and as perfectly empty of blood as if it had been washed. . . . It was very remarkable that the blood was nowhere coagulated, and did not coagulate even after being more than two hours exposed to the air; but at the same time could not be called perfectly fluid, being of the consistence of thin cream; but there was no separation of any of its component parts." This fluidity of the blood after death from angina pectoris has been noticed in other cases, as I will have occasion to notice afterwards.

Of the series of published cases and comments on this disease, which appeared within the few years after Heberden's original description, I am glad to be able to

say that one of the most instructive and most skilfully-reported came from our own country. On the 3rd of November, 1776, Dr. David MacBride, of Dublin, made a communication on this subject to his friend Dr. Fothergill, of London, to be read before the Medical Society. It contains the following case, which had been conveyed to him by letter from a medical friend whose name he does not publish. Being peculiarly interesting, both in the symptomatology and therapeutics, I extract it in full:—

"A. B., a tall, well-made man, rather large than otherwise; of healthy parents, except that there had been a little gout in his family; temperate, and being very attentive to the business of his trade (that of a watchmaker); had led a life uncommonly sedentary. From a boy had been remarkably subject to alarming inflammations of his throat, which seized him at least once in the course of the year; in all other respects well.

"In 1767 (then forty-eight years of age) he was taken, without any evident cause, with a sudden and very dispiriting throbbing under his sternum; it soon afterwards increased, and returned upon him every third or fourth week, accompanied with great anxiety; very laborious breathing; choking; a sensation of fulness and distension in his head; a bloated and flushed countenance; turgid and watery eyes; and a very irregular and unequal pulse. The paroxysm invaded almost constantly while he was sitting after dinner; though now and then he was seized with it in the morning, when walking a little faster than usual; and was then obliged to stop, and rest on any object at hand: once or twice it came on in bed, but did not oblige him to sit up, as it was then attended with no great difficulty of breathing. In the afternoon fits, his greatest ease was from a supine posture, in which he used to continue motionless for some hours, until, quite spent

and worn out with anguish, he dropt into a slumber: in the intervals between these attacks, which at length grew so frequent as to return every four or five days, he was, to all appearance, in perfect health.

"Thus matters continued for more than two years; and various antispasmodics were ineffectually tried for his relief. In 1769 there supervened a very sharp constrictory pain at the upper part of the *sternum*, stretching equally on each side, attended with the former symptoms of anxiety, dyspnœa, choking, &c., and with an excruciating cramp, as he called it, that could be covered with a crown-piece, in each of his arms, between the elbow and the wrist, exactly at the insertion of the *pronator teres*: the rest of the limb was quite free. The fits were sometimes brought on, and always exasperated, by any agitation of mind or body. He once attempted to ride on horseback during the paroxysm, but the experiment was near proving fatal to him. The difference of season or weather made no impression on him; still, in the intervals, his health was perfectly good, except that his eyes, which, before his illness, were remarkably strong and clear, were now grown extremely tender, and his sight much impaired; he had no flatulency of his stomach, and his bowels were regular.

"In this situation, Feb. 22, 1770, he applied to me for assistance. I had seen, I believe, eight or ten of these frightful cases before; and two of the patients dropped down dead suddenly. They were men between forty and fifty years of age, and of a make somewhat fleshy; the fate of the others I was not informed of; or, at least, cannot now recollect.

"Having formerly found the total inefficacy of blisters, and the whole class of nervous medicines, in the treatment of this anomalous spasm, I thought it now right to attempt

the correcting or draining off of the irritating fluid. To this purpose, I ordered a mixture of *aq. calc. mag. c.* with a little of the *aq. juniperi com.* and a small proportion of Huxham's antimonial wine; as an alterative, I put the patient on a plain, light, perspirable diet; and restrained him from all viscid, flatulent, and acrimonious aliments. By pursuing this course he was soon apparently mended; but after he had persisted in it regularly for, at least, two months, he kept for some time at a stand. I then ordered a large issue to be opened in each of his thighs. One only was made; however, as soon as it began to discharge, his amendment manifestly increased; the frequency and severity of the fits abated considerably; and he continued improving gradually, until, at the end of eighteen months, he was restored to perfect health; which he has enjoyed without the least interruption till now, except when he has been tempted (perhaps once in a twelvemonth) to transgress rules, by making a large meal on salted meat, or indulging himself in ale, or rum punch (each of which never failed to disorder him from the beginning of his illness); and even on these occasions he has felt no more than the slightest notice of his former sufferings; insomuch that he would despise the attack if it did not appear to be of the same stock with his old complaint. No other cause has had the least ill effect on him. Though rum was so constantly hurtful, yet punch, made with a maceration of black currants in our vulgar corn spirit, is a liquor that agrees remarkably well with him. He never took any medicine after the issue began to discharge; and I have directed that it shall be kept open as long as he lives. The inflammations of his throat have disappeared for five years past; he has recovered the strength and clearness of his sight; and his health seems now to be entirely re-established."

This treatment, which would probably find few advocates among the advanced scientific physicians of the last decade of the nineteenth century, was adopted by the celebrated Dr. Erasmus Darwin, the grandfather of the still more famous Charles. In a volume published in 1796 he tells us: "Four patients I have now in my recollection, all of whom I believed to labour under the angina pectoris in a great degree; which have all recovered, and have continued well three or four years by the use, as I believe, of issues on the inside of each thigh; which were at first large enough to contain two peas each and afterwards but one. They took, besides, some slight antimonial medicine for a while, and were reduced to half the quantity or strength of their usual potation of fermented liquor." This distinguished physician goes on to give "Dr. MacBride, physician at Dublin," credit for having first recommended the use of "femoral issues" in angina pectoris; and proceeds to add: "I was further induced to make trial of them, not only because the means which I had before used were inadequate, but from the ill effect I once observed upon the lungs, which succeeded the cure of a small sore beneath the knee; and argued conversely, that issues in the lower limbs might assist a difficult respiration."

Proceeding to comment on the above case, Dr. MacBride makes the following very interesting observation:—"This very alarming disease is not so common in this country as it appears to be in England; as the gentleman who furnishes the above history has not, in near forty years' most extensive practice, met with more than eight or ten cases; and it is now above six years since he has heard of any—a sure proof of its not being frequent, since, if it had, he undoubtedly would have been often consulted. I have also, within these few days, conversed with some more of our most eminent practitioners, who have seen a

great deal of business; but not one of them remembers any case exactly similar to the present, or those which have been so graphically described by yourself and Dr. Heberden. For my own part, I have never met with one; but if I may be allowed to turn theorist on this occasion, I should ascribe the exemption to two circumstances, wherein the people of the two kingdoms materially differ: the one, respecting the proportional numbers of sedentary persons; the other, regarding the general course of living. In England, and especially the capital, at least fifty people are occupied in the several branches of the finer mechanic arts, for one that is so employed in Ireland; and the posture, in which the most part of these ingenious artists are constrained to sit at their work, necessarily tends to impede the circulation through all the parts contained in the *thorax*. With you, men of all ranks certainly eat larger quantities of gross animal food, and drink more freely of malt liquors and sophisticated wines, than we do; for our lower sort may be said to live entirely on a vegetable and milk diet; and those who are in anything like easy circumstances constantly drink either punch or wines, especially French; and our port, as yet, is brought to us entire from abroad; the vintners not having found out the way of brewing it at home. Hence, I presume, it is that we much seldomer see morbid degrees of obesity than you do; and from all the dissections of persons who have been carried off by the disease in question, it appears that an increase of fat is, at least, one predisposing cause. The immediate paroxysm, indeed, seems to depend on a spasm of the heart, which, we may well believe, can only take place in an inferior degree, as long as the patient continues to survive the fits; since a spasm here, of any violence or duration, must infallibly prove fatal. . . . ." The keen observations embodied in the above quotation have been well corrobo-

rated by the collective experience of other physicians: that the disease is English above all things, one of high life and good feeding rather than of the opposite conditions, and occurring preferably in subjects with a tendency to fatty disposition, are facts attested by universal experience.

What the internal conditions are which determine the external manifestation of symptoms connoted by the term *angina pectoris* is a query which has proved a striking specimen of a pathological *pons asinorum*. The following list of views have been advocated by various authorities:—Dr. Heberden himself attributed it to spasm, which he did not, however, quite definitely locate; he seems to have looked upon the characteristic pain as a "cramp"—somewhere. Dr. Macbride, of Dublin, whose case I have already quoted, located the spasm in the muscular substance of the heart. In this he was followed by Dr. Latham. The famous apostle of vaccination, Dr. Edward Jenner, was the first to advance the view that the symptoms were dependent on the existence of calcification of the coronary arteries; and this idea was further expanded by Sir Everard Home, who explained the pain by the pressure of the cardiac nerves against such calcified arterial tubes—during spasm of the muscular tissue. Desportes made it a neuralgia of the pneumogastric, Laennec of the sympathetic, Bouillaud of the phrenic, Jolly of the intercostal nerves, Piorry of the brachial (and some thoracic) nerves, Romberg of the cardiac plexus. Bamberger, with his characteristic German super-refinement of nomenclature, made it a *hyperkinesis with hyperæsthesia* of this plexus. Dr. Erasmus Darwin attributed it to spasm of the diaphragm, and Butter regarded the condition as symptomatic of diaphragmatic gout—a view in which he was followed by MacQueen, Johnston, and Blackall. Rougnon, of Besançon, attributed all the phenomena to the results of ossification of the

costal cartilages. Virchow ascribed them to embolic plugging of the coronary arteries.

The most important evidence of any has, to my mind, been furnished by Lancereaux and Peter, who, in several cases, reported distinct evidence of neuritis in the nerves of the cardiac plexus. This would, I think, satisfactorily account for the pain; and the irritative reflex inhibition, which might be a consequence of the involvement of the branches of the pneumogastric engaged in that plexus, would account for the sudden death which so often marks the period of this painful affection.

In the face of the varying conditions which have been found on examination of the bodies of persons who have died with the symptoms of angina pectoris, it is somewhat curious to find this condition defined as follows by the writer on the subject in the "Twentieth Century Practice of Medicine":—"Angina pectoris . . . is an affection of the heart characterised by paroxysms of agonising pain of sudden occurrence which irradiate usually to the shoulder and left arm, attended with an awful sense of impending death, *caused by sclerosis of the coronary arteries* at or about the aortic orifice." On the next page but one we read: "As certain cases, even fatal, have been found without discoverable anatomical lesion . . . "; and later on: "Tacchi reports the following lesions observed in 70 cases: lesion of the coronary arteries, alone or accompanied with other lesions of the heart or great vessels, 38 times; insufficiency of the aortic sigmoids, 12 times; aneurysm of the arch of the aorta, 5 times; fatty degeneration of the heart, 4 times; hypertrophy and dilatation, 4 times; pericarditis, 3 times; suppuration in the mediastinum, 1 time; negative results, 3 times." It requires no very special knowledge of either logic or medicine to be able to see that a chain of 70 links, of which three essential ones have been sub-

jected to a process of instantaneous evaporation, has ceased to function as a bond of union between a fact and a theory.

That the great majority of cases of angina pectoris are accompanied by structural changes in the heart or aorta, or both, is a necessary conclusion from the great bulk of the evidence which has up to the present been collected on the subject. Of 19 cases tabulated by Dr. Ogle in a very able communication to the Pathological Society of London, 12 presented calcification of the coronary arteries; 12, fatty degeneration of the cardiac muscle; 10, atheroma of the aorta; and 6, valvular disease of pronounced character.

A close approximation to the pathological explanation of angina pectoris was made by Wall, whose communication to Heberden on the subject was, like the letter from the "Unknown," elicited by the publication of his original description. Both letters were read at the same meeting of the College of Physicians; and that of Wall contains the first account of a *post-mortem* examination of a patient who succumbed in a paroxysm, which, so far as I know, followed Heberden's baptism of the symptom-group. This man "died after having struggled in the fit about two hours," and "the heart appeared of an uncommon size, and was covered with a great quantity of fat; the pericardium contained not less than a pint of fluid . . ; no part appeared diseased till we opened the left ventricle; and there, the semilunar valves, placed at the origin of the aorta, were found to be perfectly ossified. They did not, as usual, lie flat upon the divided orifice of the vessel; but stood erect, and appeared to be immovable. They were entirely osseous through their whole substance . . ; the aorta was at its curvature considerably enlarged; and for near an inch from the heart was in part ossified; there being several bony scales or laminæ in it, but not con-

nected with one another." On this condition he makes a series of interesting remarks, of which the following forms the concluding paragraph:—"It is possible that this induration of the semilunar valves may not be always the cause of this disease; though it seems not improbable that some malformation in the heart or vessels, immediately proceeding from it, may be so. Indeed, when we consider how frequently such indurations in the valves of the heart have been found; that the disease in question does not come on till a person is advanced in years, and consequently till a rigidity in every part naturally comes on; we shall, I think, be inclined to imagine that a preternatural induration of the parts necessary to the circulation through the heart may be the predisponent, if not the efficient cause of this disorder."

To the great Edward Jenner, the philanthropic apostle of vaccination, is attributable the credit—if, indeed, any credit really exists—of having tried to explain the symptoms by the presence of disease of the walls of the coronary arteries. This suggestion is contained in a very interesting (and otherwise remarkable) letter—also communicated to Dr. Heberden—on the case of his revered friend and former teacher, John Hunter, whom he had seen (in 1776) after a second attack of angina pectoris. The intrinsic interest of this letter makes it well worth reading at the present day, even apart from the passing inspiration which every true lover of medicine must feel from the association of the great names connected with it.

"When you are acquainted with my motives, I presume you will pardon the liberty I take in addressing you. I am prompted to it from a knowledge of the mutual regard that subsists between you and my worthy friend, Mr. Hunter. When I had the pleasure of seeing him at Bath last autumn, I thought he was affected with many symptoms

of the angina pectoris. The dissections (as far as I have seen) of those who have died of it throw but little light upon the subject. Though in the course of my practice I have seen many fall victims to this dreadful disease, yet I have only had two opportunities of an examination after death. In the first of these I found no material disease of the heart, except that the coronary artery appeared thickened.

"As no notice had been taken of such a circumstance by anybody who had written on the subject, I concluded that we must still seek for other causes as productive of the disease; but about three weeks ago Mr. Paytherus, a surgeon at Ross, in Herefordshire, desired me to examine with him the heart of a person who had died of the angina pectoris a few days before. Here we found the same appearance of the arteries as in the former case. But what I had taken to be an ossification of the vessel itself, Mr. P. discovered to be a kind of firm, fleshy tube, formed within the vessel, with a considerable quantity of ossific matter disposed irregularly through it. This tube did not appear to have any vascular connection with the coats of the artery, but seemed to lie merely in simple contact with it.

"As the heart, I believe, in every subject that has died of the angina pectoris, has been found extremely loaded with fat, and as these vessels lie quite concealed in that substance, is it possible this appearance may have been overlooked? The importance of the coronaries, and how much the heart must suffer from their not being able duly to perform their functions (we cannot be surprised at the painful spasms), is a subject I need not enlarge upon, therefore shall just remark that it is possible that all the symptoms may arise from this one circumstance.

"As I frequently write to Mr. H., I have been some time

in hesitation respecting the propriety of communicating the matter to him, and should be exceedingly thankful to you, sir, for your advice upon the subject. Should it be admitted that this is the cause of the disease, I fear the medical world may seek in vain for a remedy, and I am fearful (if Mr. Hunter should admit this to be the cause of the disease) that it may deprive him of the hopes of a recovery."

And in another letter Jenner says—"Soon after Mr. Paytherus met with a case. Previous to our examination of the body I offered him a wager that we should find the coronary arteries ossified. This, however, proved not to be exactly true; but the coats of the arteries were hard. . . . At this time my valued friend, Mr. John Hunter, began to have the symptoms of angina pectoris too strongly marked upon him; and this circumstance prevented my publication of my ideas on the subject, as it must have brought on an unpleasant conference between Mr. Hunter and me." And although neither Clive nor Everard Home would condescend to adopt his views at first, we are told that—"When, however, Mr. Hunter died, Mr. Home very candidly wrote to me, immediately after the dissection, to tell me I was right."

In the year (1775) before Jenner had communicated his letter to Heberden, Dr. Fothergill had been treating a victim of angina pectoris, and "in the evening, in a sudden and violent transport of anger, he fell down and expired immediately." A *post-mortem* examination was made "by that very skilful and accurate anatomist, John Hunter, F.R.S.;" and "the two coronary arteries, from their origin to many of their ramifications upon the heart, were become a piece of bone."

In his post-graduate lectures of last year Professor Osler, of the Johns Hopkins University, has given an excellent

summary of the present state of our knowledge of the morbid anatomy of angina pectoris. The great authority on the statistics of this subject is Huchard. "In a supplementary chapter to his work you will find a summary of 145 autopsies in cases of angina, gathered from the literature. In 17 cases there was mention only of a lesion of the coronaries without further specification; of 128 there were 68 with lesions of both coronary arteries, 37 of the left vessel, 15 of the right, and in 12 the seat of the lesion was not stated. In the 128 cases obliteration or stenosis of the vessels had occurred, and of these in 121 there was atheromatous narrowing or thrombosis, in 5 embolism, and in 2 compression. Fatal cases are on record in which the coronary arteries have been found normal; most of these are instances of adherent pericardium or valvular disease." It is hardly necessary to dwell further on the still unsatisfactory state of our knowledge of the morbid anatomy of a very important condition.

The pain—the urgent symptom—in angina pectoris has not, to my mind at least, been ever quite satisfactorily explained. The old idea, that it was due to cramp of the cardiac muscle, may account for that portion which is localised in the præcordial area, and has been of recent years advocated with characteristic argumentative power and lucidity of expression by Dr. Goodhart, of Guy's Hospital. But this cannot account for the central focus of mid-sternal pain, which I have always observed to be the most severe, and which was so in the experience of Heberden himself. Wall, whose paper I have already quoted, and who was one of the earliest followers of Heberden, in contributing to the literature of this subject, attempted to account for the humeral pain, which is generally so prominent a characteristic of a paroxysm of angina. "It may be difficult to account satisfactorily for

the symptom above taken notice of, when the pectoral muscle is so particularly affected; but this appears to be merely spasmodic, and to arise from an irritation on the nerves of the thorax and heart. Perhaps it may throw some light on this affair, to consider that the *nervi intercostales*, or *sympathetici*, distribute many branches to the heart, *arteria pulmonalis*, and aorta; the other branches of the same nerves surround the subclavian arteries and veins, and communicate with the *cervicales*, which latter terminate at the insertion of the deltoid muscle into the *os humeri*, which is precisely the place affected by the spasm already mentioned."

Erasmus Darwin, in his description of the anginal paroxysm, observes that—"A pain in the arms, about the insertion of the pectoral muscle, generally attends, and a desire of resting by hanging on a door or a branch of a tree by the arms is sometimes observed." His theory of the phenomenon, which he puts forward elsewhere, is as follows:—"As a principal branch of the fourth cervical nerve of the left side, after having joined a branch of the third and of the second cervical nerves, descending between the subclavian vein and artery, is received in a groove formed for it in the pericardium, and is obliged to make a considerable turn outwards to go over the prominent part of it, where the point of the heart is lodged, in its course to the diaphragm; and as the phrenic nerve of the right side has a straight course to the diaphragm, and as many other considerable branches of this fourth pair of cervical nerves are spread on the arms, does not a pain in the left arm distinguish a disease of the pericardium, as in the angina pectoris, or in the dropsy of the pericardium? and does not a pain or weakness in both arms distinguish the dropsy of the thorax?"

The accounts contained in the extracts which I have already

given include the best descriptions that, so far as I know, have hitherto been published of the curious, interesting, and comparatively uncommon group of symptoms which are usually connoted by the term angina pectoris. I will now proceed to compare and contrast the prominent features of my own case with those of the principal examples furnished, and in the light of the statistics collected by the other prominent authorities who have dealt with the same subject.

With regard to the radiations from the central focus of pain, Huchard tabulates the reflexions as follows:—"Irradiation occurs (1) preferably to the upper extremities, and especially to the left arm; (2) to the cervical plexus with pains in the neck, face, tongue (Trousseau), chin, and ear (Butler, Wichmann), to the temporo-maxillary articulation where it may produce a kind of trismus; to the external cardiac branches of the pneumogastric, to the throat, larynx, stomach and liver, producing aphonia, a kind of globus-hystericus, a sensation of heat in the epigastrium, nausea, eructation, vomiting, gaseous distension, pains in the hypochondrium simulating hepatic colic; (4) to the intercostal and diaphragmatic nerves, with pains in the thorax, vertebræ, breast, and hyperæsthesia in the mammary region, as observed by Laennec; (5) to the hypogastric region (Blackwell), to the testicle with swelling (Hoffmann, Laennec, Gintrac), ilio-scrotal neuralgia (Axenfeld), strangury (de Lorme), dysuria (Blackwell, Lartigue); and (6) to the lower extremities (Friedreich)."—(Quoted by Whittaker).

The prognosis of *sudden death* which appears to have been so prominently before the minds of the older physicians was not verified in this case. On this point Dr. Heberden, in his later description of the condition, given in the "Commentaries," observes: "The termination of the angina pectoris is remarkable. For if no accident intervenes, but the disease go on to its height, the patients all suddenly fall

down, and perish almost immediately. Of which, indeed, their frequent faintnesses, and sensations as if all the powers of life were failing, afford no obscure intimation." And Dr. Wall, who was inspired by Dr. Heberden's original communication to the College of Physicians of London to write to him on the subject, states: "I have seen 12 or 13 persons afflicted in this manner, of which number one, who applied early in the disease, was relieved considerably by the use of antimonial medicines joined with the fœtid gums. He is still living; and goes about with tolerable ease. Two were carried off by other disorders; all the rest died suddenly." In this connection Professor Gairdner—quoted by Dr. J. W. Moore, in a paper on this subject which appeared in Vol. LXXXIX. of this Journal—observes:—"The fact of sudden death, superadded to the evidence of certain sensations preceding death, may be considered to afford the nearest approach we have to an accurate definition of this disease."

With regard to the question of the *sex* of the subjects of angina pectoris, universal experience bears testimony to the vastly greater degree of frequency of its occurrence among males; so that my patient formed a unit of the small minority. Heberden, in his "Commentaries," observes: "I have seen nearly one hundred people under this disorder, of which number there have been three women." Of 88 cases collated and commented upon by Sir John Forbes, but 8 occurred in females; and the experience of other authorities bears very similar testimony. Lartigue tabulated 67 cases, and of those there were but 7 women. Huchard, in his very exhaustive discussion of this question, has collected statistics of 237 cases of true angina, and of them only 42 were females. In Professor Osler's series of 40 cases of true angina, there was but one woman.

In connection with the question of the *age* at which angina most frequently appears, M. Lartigue has tabulated 65 cases.

Of this number 1 occurred at 17 years; 1 at 21; 1 at 25; 1 at 29; 6 between 30 and 35; 2 at 40; 11 between 41 and 51; 25 between 51 and 60; 13 between 60 and 70; and 4 between 71 and 77. My patient surpassed the "record" limit of this statistical table. Even by her own account she was 78; and some of her lady friends more than once insinuated to me that she had, to their own personal knowledge, remained at that age for a considerable number of years before. Professor Osler's paragraph on this subject is so admirably clear and succinct that I will quote it in full: "The age at which it is most common is that of artero-sclerosis—after the fiftieth year of life. Of the forty cases on my list there were only four under the fortieth year. One of these, a man, aged thirty years, had had syphilis five years before; the other case, a woman, aged thirty-two years, had mitral valve disease; the third case had terrible attacks of angina following chronic pleurisy. In the fifth decade there were thirteen; in the sixth, thirteen; in the seventh, nine; and of one case I did not get the exact age. The average of the thirty-nine cases was about fifty-three years. Cases are reported in quite young individuals, even in children, but such are almost invariably the subject of chronic valvular diseases or adherent pericardium." The age of 52 has, indeed, been so frequently observed to be a favourite period for the onset of true angina, that some have suggested that it might deservedly be designated the *anginal climacteric*. Of the 88 cases collected by Forbes, 72 had passed the age of 50 before the first attack.

With regard to the *nationality* of angina pectoris, my patient was on the side of the majority. As I have already observed, the preference of this symptom-group to select its victims from the inhabitants of England has been noticed by the various authorities on the subject, almost from the time of Heberden's original description. My hearers will recall the remarks made on this subject by Dr. MacBride.

It has been said of angina pectoris as Sydenham said of gout—that it more frequently victimises "the *rich* than the poor and the *wise* than the foolish." In regard to both these qualifications, my patient was also among the majority. She was well-born, well-connected on both sides of the house, and had always lived in affluence.

With regard to *mental energy*, she was also enrolled with the greater number of the victims of angina pectoris. Her intellectual activity has been already referred to. As I have remarked in the preceding paragraph, angina possesses this feature in common with gout—of manifesting a decided preference for the higher types of cerebral function. It has often displayed the best discriminating powers in the selection of its sufferers: these have included some of the best specimens of artistic and scientific culture. Medicine and natural history are well represented by John Hunter and Charles Darwin, theology by Dr. Chalmers, general literature by Matthew Arnold, sculpture by Thorwaldsen, and "her rainbow sister" by our countryman, John Leech.

Obesity has often been noticed to be a frequent concomitant of the symptoms of angina pectoris. Even John Hunter, whose restless activity of both mind and body has hardly ever been surpassed in the history of the human race, waxed fat after he had become a victim of angina. This was attributed by his biographer—and, I have no doubt, justly—to deficiency of accustomed exercise. Many other observers have pointed out the greater frequency of the occurrence of angina in stout persons. My patient formed a complete contrast to the typical subject of angina. She was tall, thin, and bony, and had always been so. The short neck and broad shoulders which have so often been noticed in connection with angina—as they have with the other conditions of gout and apoplexy, which are also so

intimately associated with atheroma—were, of course, conspicuously absent.

The *temper* of the sufferer has often been observed to form a most important feature in connection with the origin of angina, and the progress and repetition of its symptoms. John Hunter's classic case, where he "felt his life to be in the power of any rascal who choosed to annoy or tease him," is well known to every one of my hearers who is interested in the personal history of the intellectual giants of our profession. The temper of my patient corresponded fairly well with that of the great pathologist. It has been said of a frequently associated condition, "a fit of the gout is often a fit of bad temper;" and, with corresponding limitations, the same may also be said, I think, of angina pectoris.

One more clinical feature of this case is, I think, worthy of remark Trousseau's conception of angina as an *epileptiform neuralgia*, or *cardiac epilepsy*, is well known. The manner, already alluded to, in which the aura-like pain often commenced at the periphery and shot up to the shoulder, and inwards to the mid-sternal and precordial regions, was curiously suggestive of the view of the great physician of the Hôtel Dieu.

I have already expressed the opinion that all writers on the subject appear to have failed to offer anything like a satisfactory explanation of the radiations of the paroxysmal pain which characterise angina pectoris. If I may venture to rush in where so many wiser and more experienced observers have judiciously feared to tread, I would point out to my hearers what has appeared to me to be a considerable similarity between the paroxysms of angina and the painful *cramps* of alcoholic neuritis. Having regard to the different systems of nerves affected, I venture to suggest that the analogy will hold good. Adopting, as I do, the idea based upon the theory of Romberg, and the *post-mortem* demonstra-

tions of Lancereaux and Peter, that the symptoms are primarily due to the affection of the nerves of the cardiac plexus, the variable amount of radiation of pain may simply be due to the varying extent to which this neuritis has extended to other filaments of the vaso-motor nerves. May not this vaso-motor neuritis be more intimately associated with the distribution of atheroma than pathology has yet pointed out?

With regard to the *treatment* of angina pectoris, little explanation is required of the action of the anodyne and antispasmodic medicines that are usually employed. Cases of *cure* have been recorded under the use of powdered valerian root (Wichmann, Jurine), of assafœtida, of camphor, of extract of hemlock (Johnston), of sulphate of zinc (Perkins), of flowers of sulphur (Munk), of Fowler's arsenical solution (Alexander, Cahen). Bretonneau persuaded himself that he had cured a number of cases by the copious administration of sodium bicarbonate, sometimes associated with belladonna. I am doubtful, more than doubtful, of the reality of a genuine cure of a case of true angina by such remedies.

The effects of the use of *wine* were unsatisfactory in my case. They were precisely what might have been anticipated in presence of chronic neuritis, and very similar to those described by Sir Everard Home in the case of John Hunter. "As he had not drank wine for four or five years, he was advised to try it, which he complied with; but found the spasms more easily brought on after using it than on those days on which he drank none; and they were always more readily produced after eating a hearty meal."

The application of *amyl nitrite* to the relief of the paroxysms of angina pectoris is a boon which has been conferred upon suffering humanity by Dr. Lauder Brunton; and if that great physiologist and therapeutist had done nothing else original in the whole of his professional career, I conceive that this achievement alone had thoroughly earned

for him the high reputation which he so deservedly enjoys as a scientific benefactor of the human race.

The theory of the action of amyl nitrite on the circulation, which appears to be generally received, is that it is due to the liberation of nitrous acid:—

$$\underset{\text{Amyl nitrite.}}{C_5H_{11}NO_2} + H_2O = \underset{\text{Amyl alcohol.}}{C_5H_{12}O} + HNO_2$$

The nitrous acid thus set free rapidly undergoes full oxidation:—

$$3HNO_2 = HNO_3 + H_2O + 2NO$$

The oxide of nitrogen so formed instantaneously exerts its well-known affinity for oxygen:—

$$NO + O = NO_2$$

And the peroxide so produced at once unites with water to form more nitric acid:—

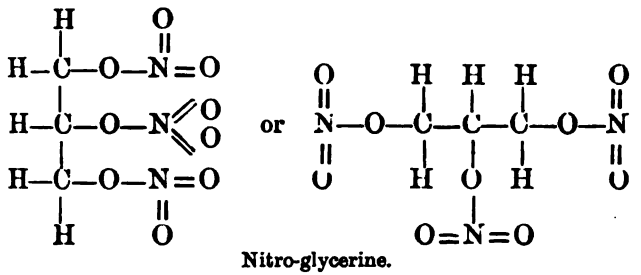
$$3NO_2 + H_2O = 2HNO_3 + NO$$

Several other nitrites have, we are told, actions very similar to that of amyl. *Nitro-glycerine* (tri-nitrin, glonoïn) is the nitro-compound which, after amyl nitrite, has achieved the highest reputation in this connection. Its action is said to be similar to that of the latter remedy, but manifesting itself more slowly, and lasting a longer time. Some authorities appear to have been greatly impressed by its effects; Trussewitsch conferred upon it the appellation of *angioneurosine*, and recommended its use in spastic migraine and other forms of neuralgia, in sea-sickness, and other conditions where the symptoms of cerebral anæmia happen to form a prominent feature.

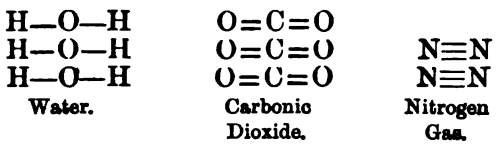
The intimate structure of the nitro-glycerine molecule indicates the likelihood of rapid chemical transformation, which is borne out by examination of its explosive properties. I will turn aside for a moment to consider its constitution, although I have been disappointed in its therapeutic action.

"Nitro-glycerine has been analyzed, and, unless the principles of our modern chemistry are all wrong, its molecules

have the composition indicated by the symbol $C_3H_5N_3O_9$. Note that there are already in the molecule nine atoms of oxygen, more than enough to satisfy all the atoms, both of carbon and of hydrogen. When carbon burns, C_3 takes only O_6, H_5 only $O_{2\frac{1}{2}}$, and why is not the affinity of these atoms for oxygen satisfied already? The only answer that can be suggested is, because the oxygen-atoms, although parts of the same molecule, are not in combination with the carbon or hydrogen atoms in those molecules; and what is this but an admission that the molecules have a definite structure by which these atoms are kept apart?



Nitro-glycerine.



Water. Carbonic Dioxide. Nitrogen Gas.

". . . Now, when the substance explodes, what takes place is simply this: The oxygen atoms at one end of the molecule rush for the carbon and hydrogen at the other end, and the molecule is broken up, as our next diagram indicates; only, as there are not enough atoms to form even molecules, we must consider that one atom of hydrogen and one of nitrogen are borrowed from the fragments of a neighbouring molecule, broken up at the same time. You see, therefore, that the chemical action is very nearly the same as in the burning of gunpowder, the difference being that while in the powder the carbon and oxygen atoms belong to different molecules, in nitro-glycerine they belong to the

same molecule. In both cases the carbon burns, but in the nitro-glycerine the combustion is within the molecule. This difference, however, which the theory indicates, is one of great importance, and shows itself in the effects of the explosion.

"In gunpowder the grains of charcoal and nitre, although very small, have a sensible magnitude, and consist each of many thousand if not of many million molecules. The chemical union of the oxygen of the nitre with the carbon-atoms of the charcoal can take place only on the surface of charcoal-grains; the first layer of molecules must be consumed before the second can be reached, and so on. Hence the process, although very rapid, must take a sensible time. In the nitro-glycerine, on the other hand, the two sets of atoms, so far from being in different grains, are in one and the same molecule, and the internal combustion is essentially instantaneous."—(Cooke).

This lucid explanation of the structure and subsequent demolition of the nitro-glycerine molecule would lead one to anticipate striking results from its internal administration. When we consider that the said molecule *cannot* exceed the size of a cube each of whose sides measures $\frac{1}{25000000}$ of an inch, our admiration must be increased for the wondrous architecture of Nature, and also for the discoveries of modern science. I will only say that I have been disappointed with nitro-glycerine,—therapeutically.

Chloroform and other general anæsthetics I did not think it desirable to try, on account of the age and restiveness of my patient.

The other remedies which I used require, I think, no special discussion; and I will conclude this too lengthy communication by apologising to my hearers for the length of time which I have detained them in the consideration of a subject on which so little can be said with the confidence of scientific accuracy.

SURGICAL SECTION.

SOME SURPRISES AND MISTAKES.

By SIR WILLIAM THOMSON,
President of the Royal College of Surgeons in Ireland;
Surgeon to the Richmond Hospital, &c.

[Read in the Section of Surgery, November 13, 1896.]

I FEEL to-night somewhat out of place in having transferred my seat from amongst the general audience to take, for a time, that of your President. I accept my new position with a full sense of its great honour and dignity; but I cannot help remembering that it has entailed my severance from the high office of General Secretary of this Royal Academy of Medicine, which I have filled since its foundation, and of which I have always been—as any man ought to be—very proud. The Fellows of this College have, however, called me to be their President, and in that capacity I begin to-night duties which will, I know, always be instructive to me, and I hope pleasant to all of us.

May I say a word thus early in regard to the attendance. I have sometimes noticed that our meetings were thinner than they ought to be, and that some who could confer much benefit upon us by their experience and their incisive criticism have not always given us the help they might have given. As one grows older there is a tendency to take the rest of home after the increasing duties of the day have been performed. But we are never too old to learn—or, for that matter, to teach. And there is here,

growing up about us, a younger generation—not, I hope, above taking note of some of the experiences of their elders by which they may profit in some way. We have a duty to discharge to them, just as we ourselves are debtors to our predecessors. May I, then, hope that in this respect our Session will be as bright and vigorous as many that have gone before, and that the meetings of the Surgical Section will continue to be as attractive as they have been.

I had intended, until a few days ago, to depart from the usual custom here, and to allow you to proceed at once to the ordinary business of the Section, because much pressure had prevented me giving attention to the subject-matter of an Address. But I learned that it was expected that I should say something in the way of formal opening of our Session; and so, in the hurry, I have gathered up a few facts which may not be without some interest to surgeons, and which I put under the title of "Some Surprises and Mistakes."

I think, as a rule, that most students have in their early days a good deal of trust in the sequence of events. They are enamoured by the newness of all around them in the hospitals; they have plenty of work to do, and those who do it have not time to be sceptical. They take what the books tell them so definitely, as though under no circumstances is it possible that there should be any deviation from the course of things as there described. Later on they have their faith disturbed as experience grows; but yet to the oldest of us there still remains a belief that under certain conditions certain things must happen. There is deep down in our minds the conviction "that when the brains wear out, a man must die, and there an end;" but how that is upset by our experience! There, for example, is the famous case of the man through whose

frontal lobes a heavy iron jumper was driven by a blast, and who recovered. I have seen a man who had lost a portion of his occipital bone, as large as the palm of my hand, and a cupful of brain substance, and yet years afterwards he did not seem to be anything the worse. It is true that these, what I may call "accidental experiments," have helped us to be less fearful of interference with the brain, but always with the exactitude which has been helped by deliberate research. Still, for the greater part, these rough tearings and bruisings of brain tissue are fatal; and even when with our later and better knowledge they are recovered from, they are "surprises." As our experience grows we encounter them. We—and I include physicians as well as surgeons—see cases which according to all rule ought not to live. The prognosis is, a fatal result; and yet they do well, and disappoint our certainties by their recovery. And then there are those cases which die, and we do not really know why. A man gets a scratch which ought not to hurt a child, and he dies none the less surely of shock than if he had suffered some terrible crushing injury of internal organs. What are the curious conditions in the two classes of cases—the powerful vital resistance, as we call it, in the one, which is effective against forces which we regard as unconquerable; and that other class in which vitality is so low and the nervous system so sensitive that it yields at once to what is almost a pretence of injury?

Just let me leave these suggestions for inquiry or speculation, and give you one or two examples of many which have come under my own notice. An old man was sent to me as suffering from appendicitis. He had had an attack, undoubtedly, but it had cleared up. The only signs remaining were a slightly raised temperature and a thin strip of dulness extending upwards to the iliac crest.

I made an opening, and found a little pus and an extensive granulation-lined cavity. I scraped it out and drained in the usual way. All went well; but in about a week I was startled to hear that there had been a noisy discharge of flatus from the wound and a sign of fæces on the dressings. When I saw him there was no escape of gas, but the next day I found on the dressings a fæcal concretion quite like a large nutmeg in shape and colour. Of course it had come from the intestine into the abscess cavity, and had perforated the gut wall. But how had this great mass passed through without leaving a large fistulous track, with fæcal extravasation and perhaps worse? There was never again any sign of escape of bowel contents, either solid or gaseous; and the patient, having been delivered in this way of his concretion, got quite well without further trouble. It is, I think, plain that, although the final act of extrusion took place when the flatus escaped, the opening in the bowel did not then correspond to the actual size of the concretion. Probably the gut at one point became identified by adhesion with the surrounding inflamed area, grasping and closing slowly behind the mass as it passed through into the external cavity. The escape of flatus came from what remained of the opening just before the final closure. Whatever the process, the result was one of those "surprises" that come to us, for the passage of so large a mass through the intestinal wall and its discharge externally, without causing any permanent mischief, shows what nature may do unaided by the surgeon's skill.

In the early part of this year I saw a gentleman who was suffering from a growth in the nose. I recommended him to see Dr. Woods, and I saw him later on with Sir Thornley Stoker and Dr. Woods. We came to the conclusion that he was suffering from a malignant tumour of

the antrum which had extended to the nose. We recommended an exploratory operation, and, if our opinion was confirmed, that the jaw should be at once removed. He refused the larger operation. The exploration was made by Dr. Woods. We found that the tumour did extend from the antrum, into which I could bore my finger easily. Dr. O'Sullivan, Professor of Pathology in Trinity College, declared the growth to be a round-celled sarcoma. Of that there is no doubt. The tumour returned in a couple of months, and the patient then saw Dr. Sémon in London, who advised immediate removal of the jaw. He returned home, and after a further delay he asked to have the operation performed. I did this in May last, by the usual method. I found the tumour occupying the whole of the antrum. The base of the skull was everywhere infiltrated. The tumour had passed into the right nose, and perforated the septum so as to extend into the left. It adhered to the septum around the site of perforation. This was all removed, leaving a hole in the septum about the size of a florin. He went home within a fortnight. In a month the growth showed signs of return. It bulged through the incision and protruded upon the face. Dr. Woods saw him soon afterwards, as I had declared by letter that a further operation would be of no avail. The tumour had now almost closed the right eye. It was blue, tense, firm, lobulated, but it did not break. Dr. Woods reported the result of his visit to me, and we agreed as to the prognosis. Early in October the patient walked into my study after a visit to Dr. Woods. He looked in better health than I had ever seen him. The tumour had completely disappeared from the face, and I could not identify any trace of it in the mouth. He said he had no pain of any kind. He could speak well when the opening remaining after the removal of the hard palate was plugged, and he was in

town to have an obturator made. He has since gone home apparently well. He told me he had applied poultices of comfrey root, and that the swelling had gradually disappeared.*

Now this was a case of which none of us had any doubt at all, and our first view was confirmed by the distinguished pathologist whom I have mentioned and by our own observation at the time of the major operation.

Here, then, was another "surprise." I am satisfied as I can be of anything that the growth was malignant and of a bad type. Of course we know in the history of some tumours that growth is delayed, and that in the sarcomata recurrence is often late. But this is a case in which the recurrence occurred twice—the second time to an extreme degree; and yet this recurrent tumour has vanished. What has produced this atrophy and disappearance? I do not know. I know nothing of the effects of comfrey root, but I do not believe that it can remove a sarcomatous tumour. Of course the time that has so far elapsed is very short; but the fact that this big recurrent growth no longer exists—that it has not ulcerated or sloughed away, but simply, with unbroken covering, disappeared—is to me one of the greatest "surprises" and puzzles that I have met with.

But let me turn to the other topic upon which I have still to speak to you—"mistakes." I confess to having made some in my life. It is often complained that we hear much of the successes of surgery and medicine, but little of the failures and hardly ever of the errors. I am not ashamed to say that I have erred in diagnosis, and I know that I have seen others blunder too. When one is in that unpleasant predicament it is satisfactory to know

* I saw this gentleman on the 28th September, 1897. There was no sign whatever of return.

that he is in good company—always supposing that the patient does not suffer from his default. I am afraid that there are none who can truly claim omniscience, although they sometimes look as if they did. But so long as Surgery is what it is, errors will be committed; and perhaps it would help to make them less if we were only courageous enough to say so; to point out wherein we failed, and to give some warning to others which might help to save them from mistakes.

In 1892 a gentleman consulted me for a bad throat. He was seventy-five years of age, and his story was that his throat had been sore for about two months. He spoke with a marked nasal tone. I found the right soft palate and a considerable part of the hard palate occupied by a malignant-looking flattened growth projecting from the surface about an eighth of an inch. There was an ulcer on the free margin of the palate extending to the tonsil. Externally, at the angle of the jaw, was a mass of enlarged glands, fixed, and without pain. There had been a good deal of sanious discharge from the nostril, and the posterior naris was blocked by pressure of the engaged tissues. The structures over the alveolar process of the upper jaw, at the posterior part, were infiltrated and resisting. I had no doubt that it was a malignant growth, and I said so. I advised that nothing should be done save the use of a simple antiseptic lotion. Two months later I had a letter to say that a necrosis had set in in the parts, and that the whole engaged structures had sloughed away. The fœtor was described by Dr. Rutherford as so abominable that he could not stay in the room many minutes. But in the result the ragged chasm left granulated and healed, and the patient is alive to-day at the age of seventy-nine.

Now here was a "mistake," fortunately corrected by nature. I had no doubt that my diagnosis was right, but

it must have been wrong. Sometimes, it is true, such endings have been noticed in the case of sarcomatous growths, but this was, I believed, an epithelioma, and I have not heard of such happy endings in cases of that class. I can only say that probably others would have judged as I did, and that the evidence seemed strong enough to justify my opinion. But although the growth presented the ordinary clinical characters of epithelioma, and gave evidence of secondary deposit, it is, I think, obvious that it was not of that character. The possibility of its having been a gumma, which ultimately broke down and sloughed away, is, of course, to be considered, although in the particular case I have reason for believing that there was no syphilitic history. Still I regard it as an error, and I have so scored it against myself.

Our Secretary, Mr. Lentaigne, will remember that when he was House Surgeon at the Richmond he called me to see a case of supposed strangulated labial hernia. The woman had been admitted the night before suffering from symptoms which had come on suddenly. She had had a lump in her groin which had suddenly become larger, painful, and tense, and then there followed vomiting and great prostration. A short examination was made. The tumour extended from the external abdominal ring into the left labium, and it was so tense that I at once ordered her to be brought to the theatre, where, under an anæsthetic, I was able to make out the presence of fluid, and I felt sure that I had to deal with a strangulated hernia, with an excessive quantity of serum in the sac. Others concurred in that view. I ventured to say, however, from the general appearance of the tumour, that if the patient were a man I should call it a hydrocele. A free incision soon settled the doubt, for hydrocele fluid gushed out with great force. There was no hernia at all. The case was a hydrocele of

the canal of Nück, of which I had never then seen an example, although I have seen two since. But although the case was an obscure one, and the symptoms lent colour to the original diagnosis, it was a "mistake," but a mistake which has served me well since that time.

Once, with the concurrence of my colleagues, I removed what I supposed to be a testicle, and which turned out to be a hydrocele. The man had had for some time a swelling on the left side. He had often been tapped, and had been so treated immediately before I saw him. He had a large oval tumour, slightly irregular here and there. It occupied the whole of the left side of the scrotum. It was very solid and resisting. There was no normal testicle to be made out. When I had removed it I found, on section, that it was a hydrocele sac more than half an inch thick, filled with old blood clots. The epididymis was spread out over it like a thin membrane, and could be recognised only with difficulty, and the testicle was atrophied almost beyond recognition. His comfort was added to by the operation; yet there remains the fact that we did not recognise what was the real condition of things.

I will not occupy your time by giving details of any more cases; but I could tell you of patients who have been condemned by others as having malignant disease, and who are still alive years after the pronouncement; of scirrhus of the breast, many times, which has proved to be nothing worse than a chronic abscess or an adenoma; and of abdominal tumours which, on exploration, have been declared by the most experienced and wise surgeons to be cancerous, while the patients have belied the diagnosis by living for many years in comparative health.

In the few cases I have noted in this discursive way I have mentioned the most interesting — those from which some instruction may be gathered by others as it

has been by me. As one grows older and gets beyond the trammels of the books, he realises one or two things very sharply—the fact that our diagnoses have reached a very high standard of accuracy, and the other fact that there is still a percentage of cases in which the symptoms are so confusing, that mistakes must be met with if we bind ourselves to a definite opinion. Still there are some which ought not to be made if examination is thoroughly carried out. And, therefore, the lesson which we should seek to teach in this matter is—thorough and painstaking searching-out of the meaning of signs and symptoms.

There are some cases which are so plain to the experienced surgeon that he can readily come to a decision. Probably he will be right in the majority of instances. But I have seen this facility grow into a dangerous habit. I have no respect for what I may call "snap-shot diagnosis." The first glance almost may be enough to settle the question at issue, but nevertheless the opinion then formed ought to be made as sure as possible by the careful and systematic examination of the patient. We should cultivate this habit ourselves, and we should teach our pupils how to acquire it and practise it.

Whoever has examined much at the bedside knows how often the candidate seems to want the most elementary knowledge of how to examine a patient; and personally I should estimate more highly the student who knows how to set about finding out the disease, although he might in the end be wrong, than of a diagnosis which chanced to be correct without sufficient justification for it.

I have to apologise to you for these most desultory words; but I hope that, although they may not present much that is new to many in this Section, they may have the effect of impressing upon others that we are not omnipotent or omniscient. There is no one who, if he has seen

much work, can claim to be free from mistakes. They dog the steps of the best of us. He will do well who recognises this early and tries to learn the important truths they teach—that we must not rely upon any inspiration to help us to a diagnosis, but that it must be reached, if at all, by means which are open to everyone—the diligent seeking-out and the just weighing of facts.

SUCCESSFUL CASES OF TAPPING THE PERICARDIUM.

By AUSTIN MELDON, D L., F.R.C.S.;
Ex-President of the Royal College of Surgeons in Ireland;
Senior Surgeon, Jervis-street Hospital.

[Read in the Section of Surgery, November 14, 1896.]

In 1663 Riolanus first proposed paracentesis pericardii. One hundred years later Senac stated that the operation was possible, and still later Van Swieten suggested a method of performing it. In 1806 Corvisart stated that it was not justifiable. Laennec believed it was possible. It is, however, more than probable that until 1819 it was never attempted. In that year Romero, of Barcelona, operated with perfect success. He made his incision in the fifth intercostal space at the junction of the cartilage and rib, picked up and opened the pericardium. Jowett, of Nottingham, operated in 1827, and Schur in 1839. Since that period the operation has been performed so many times, and with such eminent success, that surgeons are now in a position to consider the circumstances and mode of operation which conduce most to its successful issue.

At present just one hundred cases have been recorded, and it is certain that many more have occurred which have never been published. Out of all these cases, only once has the operation proved fatal. In this unsuccessful case the right ventricle was lacerated by the trocar. Some others have died soon after the operation, but these were cases that were moribund at the time it was undertaken. The remainder were, without exception, relieved and many of them cured. Under these circumstances it is clearly the duty of the surgeon, whenever death is imminent from cardiac pressure,

to resort to tapping. Experience, too, has shown that the operation is not attended with great danger, and certainly in cases of effusion from rheumatic pericarditis there is every prospect of recovery. It is generally held that death caused by pressure of fluid in the pericardium is a rare occurrence, but the correctness of this view I am inclined to doubt. I have seen several cases within the last thirty years in which the fatal termination was due to this cause, and might have been averted by drawing off the fluid. On one occasion I was able to verify this opinion by a post-mortem examination. It is with the view of eliciting the opinion of the members of this Section that these cases have been brought forward.

The first case occurred some years ago. The patient was a woman, fifty-eight years of age, and was admitted into Jervis-street Hospital, with dyspnœa, under the care of the Senior Physician, Dr. Stephen Myles M'Sweeney. On examination she was found to be slightly cyanosed, respirations 24; she had a feeble pulse and heart-beat, with increased præcordial dulness. From this condition, and from the history of the case, it was evident that the patient was the subject of very gradually developed "hydrops pericardii." For some time treatment seemed to be followed by improvement. Three weeks after admission, however, Dr. M'Sweeney, became convinced that the effusion was increasing, and as death seemed imminent, he requested me to tap the pericardium. The instrument I selected in this pre-antiseptic period was a long hydrocele trocar, which was washed well in very hot water. An incision was made into the skin two inches from the sternum in the fifth intercostal space, and at the suggestion of Surgeon M. H. Stapleton, in order to make it valve-like, I drew up the skin to the full extent possible before making it. The trocar and cannula were pushed one and a half inches backwards with a slight inclina-

tion upwards. On drawing out the trocar no fluid came, and as the point of the cannula did not move freely it was evident that the instrument had not entered the pericardium. Again inserting the trocar I pressed it in a quarter of an inch further, and on withdrawing it fluid of a dark colour followed. I was now able to push in the cannula to the full extent without feeling any obstruction. When 8 ozs. had been withdrawn the fluid flowed very slowly, and the instrument was therefore taken out and the wound covered with flexible collodium. As the patient appeared faint, a little brandy and ammonia was administered. An hour later all difficulty of breathing had disappeared, but although the patient expressed herself completely relieved, a very slight cyanotic condition remained. On the following morning this was gone, and her pulse was strong and regular. She left the hospital five weeks later in good health.

On the 5th of March, 1894, I was summoned to the bedside of a man, aged twenty-six. Ten days previously he complained of a severe pain in the right side, which was relieved by the application of mustard. Next day both knee-joints were inflamed, and this, together with the temperature and copious perspiration, marked its rheumatic nature. Under the use of salicylates the disease assumed a sub-acute form, and until the 3rd of March he seemed to be progressing favourably. On that date pericarditis was first diagnosticated. On the 5th his condition was as follows: The breathing was extremely difficult, respirations 32, pulse 108 and feeble, the heart-beat could barely be felt, and præcordial dulness was greatly increased, and extending to the fifth right intercostal space. Cyanosis and epigastric distress to a considerable amount were also present. Believing that death was imminent if not relieved, and finding on my return with the necessary instruments that no relief had followed the active treatment ordered, I proceeded to operate. Select-

ing the fifth intercostal space, I carefully measured one inch from the left margin of the sternum. The spot thus determined was marked with ink, and having previously adopted the usual antiseptic precautions adopted. I next selected the smallest-sized needle and washed it and the aspirator by passing through some hot carbolic lotion. The vacuum was now created in the instrument, and a small incision made through the skin at the point marked. I next measured two inches from the point of the needle, and here fixing by finger plunged the needle backwards with a slight inclination upwards until stopped by my finger. The cock of the aspirator being now turned, I was gratified to find serum appear in the glass. Almost immediately the patient's breathing improved to such an extent that when 5½ ozs. had been removed I thought it right to withdraw the needle.

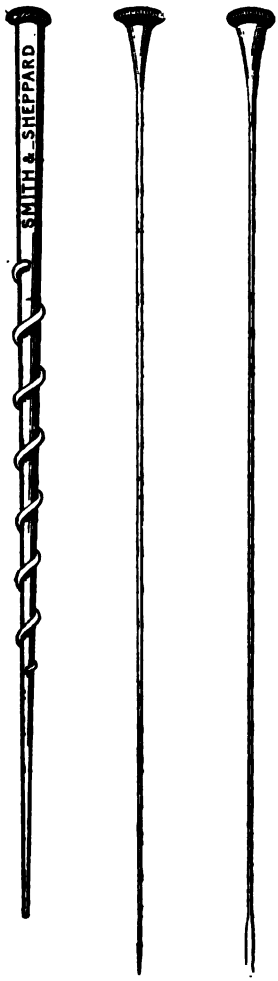
Some hours after, when leaving, the pulse was 100, the temperature 100°, respiration 24; cyanosis, dyspnœa, and epigastric distress had completely disappeared. The fluid, unlike that in my previous case, was a healthy serum.

The progress of this case was most satisfactory. Two days later the pains in the knees returned, but were readily relieved.

On the 31st of August, 1894, a case occurred in the practice of my friend, Dr. Joseph Redmond, in which 22½ ounces of dark-coloured fluid were removed, and seven days later 27½ ounces were also taken out. In this case, which recovered perfectly, a drainage tube was subsequently inserted. Dr. Patrick Hayes was the surgeon who operated.

The careful consideration of the statistics of paracentesis pericardii shows that the fifth left intercostal space, at a point one inch to the left of the sternum, is the most suitable place for puncture. The selection of the instrument would likewise seem of some importance. If too small a cannula be used it is apt to become plugged with flakes of lymph.

I show two sets of instruments which have been made for me by Messrs. Smith and Sheppard. One is to be used with,



and the other without, an aspirator. Both become arrrested when two inches of the instrument have passed into tissues, and then any further depth is obtained by a screw motion.

This latter is the suggestion of Dr. Woods. I believe that when there is any fluid in the pericardium it is quite safe to plunge the trocar in fully two inches.

I may conclude this paper by quoting Dr. Samuel West's conclusions to his able article in the Medico-Chirurgical Transactions, and which I believe should be adopted by the profession:—

"1. Paracentesis pericardii is not only justifiable, but an operation which may be safely undertaken with ordinary precautions. One case only is recorded in which the operation was fatal. With this exception all the patients were greatly relieved by the removal even of a small amount of fluid, and many recovered completely who would probably have died if the operation had not been performed. 2. The most suitable place for puncture is, in ordinary cases, in the fifth left intercostal space, one inch from the edge of the sternum, but if the pleura be adherent the puncture may be made safely much further out, and even in the sixth space. 3. The instrument employed should be a trocar and cannula, with or without aspiration. 4. The operation may be performed with advantage not only in the pericardial effusions of rheumatic or primary origin, but also in those which occur in the later stages of general dropsy, if it should appear that the fluid in the pericardium is adding to the difficulties under which the heart is placed. 5. Purulent pericarditis is best treated on general principles like an empyema—(*a.*) The pericardial sac may in these cases be safely opened and drained. (*b.*) The treatment, moreover, appears to be the only one which offers the slightest hope of recovery. (*c.*) The results are likely to be more favourable than those of empyema, for the walls of the cavity are better able to contract rapidly and thus permit of complete obliteration."

The PRESIDENT said he would be glad to hear this important paper discussed. The principal questions for consideration were, as to the place where the puncture should be made, and as to the best way of dealing with the conditions that occurred when the disease became purulent.

MR. LENTAIGNE said that the principle of the procedure which Dr. Meldon recommended should be adopted much more often than had hitherto been the case. The operation was comparatively easy of performance, and the results were likely to be satisfactory. In two cases, not long ago, which came under his notice, the operation, which would very probably have given relief, was not permitted. One was that of a little boy in whom an examination unmistakably indicated an enormous effusion in the pericardium. His parents, with the sanction, he feared, of the gentleman who had charge of the case, refused to allow any operation to be performed. In the other case the gentleman in charge would not permit an operation, saying it would be absurd to attempt to do anything in the region of the heart. Both patients were consequently allowed to die from what he might call simple heart suffocation, resulting from extreme distension of the pericardium.

DR. FRAZER said he was reminded of a case which came under his notice many years ago. It was at first thought to be one of pleural effusion, but turned out to be pericardial. The patient died, and after death a measured gallon of fluid was drawn off. That case might have been beneficially treated by operation. He had, however, had fair success in treating pericardial effusion in rheumatic cases medically. In one of them the patient, a child, had three distinct attacks of rheumatic fever accompanied with effusion; and the child had recovered, and was in health at present. Two things excited doubt in his mind in connection with cases of rheumatic fever, of which he had had three severe attacks himself. He did not know what would be the use of tapping in the case of a "pine-apple" heart surrounded with three inches of lymph. Again, there was a class of cases of rheumatic fever in which carditis occurred, followed by delirium, and in which the effusion was not at all in proportion to the severity of the cardiac symptoms.

SIR THORNLEY STOKER said the great crux was, not as to the propriety of opening or tapping the pericardium in cases of serous effusion, but as to how the case was to be dealt with when there was pus in the sac. He could not conceive that there should be

any question as to the propriety of using an aspirator to remove serum in order to prevent death by what Mr. Lentaigne had so aptly called suffocation of the heart. But when there was pus other considerations arose. Not only had it to be evacuated, but means should be provided for the removal of pus that formed subsequently. When there was only serum, after it had been removed a reactionary condition was set up, and no further accumulation of serum occurred. But where there was pus, although the heart was relieved by the removal of it, a secretion of pus would continue where there were ulcerated or diseased surfaces; and the removal of it in the first instance was almost useless, unless means for subsequent drainage were provided. One anxious question was whether this should be effected by a series of independent operations, or by the introduction of a permanent drainage tube. He thought the introduction of a trocar and cannula to such a depth as two inches totally unnecessary, except in the case of a patient of exceptional obesity. The cases to be dealt with were to be regarded as of an average type in that respect; and the question was not how far the instrument used might be put in without scratching or injuring the heart, but what was the depth necessary in order to drain the pericardium.

Prof. Bennett said he could only speak of a single case. Very early in his experience as an hospital surgeon he received a note one summer evening from a physician, long since dead, requesting him to tap the pericardium of a patient. The physician did not meet him to consider the conditions of the case—that being the practice in those days. At that time Trousseau, of Paris, had formulated an operation to be performed with a bistoury rather than a trocar and a cannula; and he (Prof. Bennett) would prefer the bistoury for an operation of the kind. He examined the man to the best of his lights at the time. He found him too ill to give any details of his previous life history; but he was unable to satisfy himself that there was fluid in the pericardium. As the man was in great distress he opened first the basilic vein on one side, and then that on the other. After there had been a full flow of blood from the second opening the symptoms were relieved. The man fell asleep, and the cyanosis entirely disappeared. He (Prof. Bennett) was soundly abused at the time for not having followed the lead of the physician in the case. After three or four days the man had a second attack of the same kind. He (Prof. Bennett) was not in attendance at the time, and in two or three hours the

man died. He (Prof. Bennett) made a *post-mortem* examination which disclosed an adherent pericardium and huge heart; and there was no doubt that if he had tapped him with a trocar and cannula he would have killed him on the spot.

Mr. Wheeler said he had had experience in two cases. In one of them Dr. Gordon diagnosticated fluid in the pericardium, and the late Dr. M'Donnell tapped with his (Mr. Wheeler's) assistance. He performed three separate tapping operations, fluid coming each time; and on the third tapping there was pus. The form of operation adopted was to dilate an opening with a forceps, pass in a cannula, and pass through it a very fine probe. The gentleman made a rapid recovery, was well in three months, and was perhaps alive now. The other case was one which was treated by the late Dr. Stoney, and subsequently by Dr. Hudson and Dr. William Moore; and he (Mr. Wheeler) tapped once with an aspirator. The gentleman got quite well.

Dr. Tobin said the difficulty as to depth might be met by using an aspirator and needle; and as soon as the needle was inside the skin the aspirator should be turned on. The moment the needle entered the pericardium the flow of fluid would show that it need be pressed no farther.

Sir William Stokes said it had never fallen to his lot to perform this operation, but it struck him as somewhat remarkable that in the cases mentioned by Mr. Meldon a single tapping should have been sufficient. In many cases it was sufficient; but they knew that cases of serous effusion occurred in which frequent tapping was necessary.

Mr. Heuston said he did not believe in tapping the pericardium in a blindfold manner. When they were sure that there was only serous effusion they would be justified in using the trocar or aspirator in such a way as Mr. Meldon had adopted with such excellent results. But there were other cases in which the only proper thing for the operator to do was to make a free opening down to the pericardium, so as to be able to see what he was doing. In suppurative pericarditis it was absolutely necessary to make an incision at an early stage.

Mr. Myles asked could Mr. Meldon give any authentic information as to the exact extent to which displacement of the heart took place in his case, or in cases of the kind. Students were taught that in cases of pericardial effusion the apex of the heart was displaced upwards. If the heart simply lay in its normal place it would lie

at the bottom of the fluid, and a displacement would take place in the thorax at the expense of the lungs. Again, with reference to the position to be selected for the insertion of the instrument, he wanted to know what was to become of the left pleura? He believed that in the majority of cases the trocar, if inserted at the spot indicated by Mr. Meldon, would invariably go through the left pleura.

Mr. M'Ardle remarked that the only person who seemed to know anything about the subject was the gentleman who read the paper; and he had the fact of success to support his position. Although knowing nothing of the subject, he (Mr. M'Ardle) held that Mr. Meldon was justified in passing the trocar and cannula into the pericardium in the manner he had stated, for two reasons. First, because a safer exit for the contents of the pericardium was thereby obtained than by any other procedure. If the pleura was cut through in order to make a free opening before reaching the pericardium, the patient was exposed in a tenfold degree to the danger of an inflammatory attack. The question of depth was very easily determined. When the point of the instrument was found to be in connection with the fluid, there was no reason for going two inches into the thorax. He supported Mr. Meldon's position of tapping in preference to incision.

Dr. Travers Smith asked did Mr. Meldon consider tapping for the second time more dangerous than the first tapping.

Dr. Taylor said he recently saw a case in Sir Patrick Dun's Hospital which was under the care of Dr. Purser. It was that of a boy who had been four or five days there with symptoms of ordinary pericarditis. He was cyanosed, cold, covered with perspiration, and in a dying condition. He aspirated his pericardium by passing a needle into the fifth intercostal space close to the sternum, and fluid came out of a sero-fibrinous character, the fœtor of which was intolerable. Over a pint of fluid was drawn off, after which the boy seemed much better. He continued better for some hours, but the next morning suddenly got cyanosed and died. A *post-mortem* was made by Dr. Purser and Dr. Walter Smith, and on taking away the sternum and costal cartilages on each side they found that the two pleural sacs had separated some distance from the middle line of the pericardium, and had come up behind the sternum and costal cartilages on both sides. So that neither of the pleural sacs would have been opened either by a needle or by any other instrument cutting down at the point selected. He agreed

with Sir Thornley Stoker that there was no necessity for inserting any instrument so deep as two inches. In most cases one inch would be sufficient.

Dr. John W. Moore remarked that in Murchison's text-book a distended pericardium was represented as displacing the liver downwards, so as to cause an apparent displacement of it, the tumour caused by the distending fluid pushing the left lung to the left, and the right lung to the right. That condition of things was sufficient to show that tapping might be performed with confidence within an inch of the sternum on the left side.

Mr. Meldon, in reply, said the position of the patient was of great importance in determining the depth to which the instrument should be inserted. In the first case, while the patient was lying on his back, he only put in the trocar an inch and a half, and did not succeed in reaching the fluid. In that position, when the pericardium contracts as the fluid escapes, any lesser depth than two inches would result in the instrument parting company with it. Of course, he would not plunge a trocar in to that extent unless satisfied that there was effusion into the pericardium. In doubtful cases he would follow Mr. Tobin's suggestion. Selecting a No. 1 needle, and having created a vacuum in the aspirator, the instrument should be pushed in until the eye is covered and the stop-cock then turned on. The needle may now be pushed in to a reasonable distance in search of fluid. Even should the heart be touched by such a small instrument, it would not be so very serious as has been stated, especially as the left ventricle has been designedly punctured and the patient relieved by the operation. The direction, too, which he adopted in his cases is another point of safety. He was not aware of any case of rheumatic pericarditis in which a second tapping was required. The patient in the second case was kept in hospital for five weeks after the operation, because it was thought that all the fluid had not been drained off; but it never collected afterwards. Dr. Moore had answered Mr. Myles as regarded the anatomical conditions of the case. As to a second tapping being more dangerous than the first, he had never tapped a second time, so that he could not say whether it was or not. Statistics did not show it to be so. He had never, of course, attempted to tap unless he felt perfectly sure that there was fluid in the pericardium. If he felt the smallest doubt that there was, he would not attempt to tap. In one of his cases the man's death was imminent from the pressure of the fluid, and he had not the

smallest hesitation in going in the two inches. He would like, in reply to Dr. Smith, to say that there are two special points in reference to the signs of pericardial effusion to which he would draw attention. The first manifestation is increased broadening of the cardiac dulness at the lower portion—first to the left and then to the right, until there is absolute dulness in the fifth intercostal space in the region named by Ebstein—the cardiac hepatic angle. The second symptom to which he wished to refer is the occurrence of intermission of the pulse during inspiration at a time when the heart is beating without such intermission. Most of the other observations had reference to purulent pericarditis, which was not treated of in this paper, but he quite agreed with the opinions expressed that this condition is best treated by incision and drainage.

ON ACUTE INTESTINAL OBSTRUCTION.

By J. S. M'ARDLE, F.R.C.S.I.;
Surgeon to St. Vincent's Hospital, Dublin.

[Read in the Section of Surgery, December 11, 1896.]

I BASE this communication on the results of 41 operations carried out for the relief of acute intestinal obstruction, that is, operations carried out during the acute trouble. The list does not include laparotomies for chronic obstruction or intestinal affections other than those in which life was in imminent danger at the time of the procedure. Of these, 34 recovered and 7 died. Not one of the cases which succumbed did so as a result of operation. Death occurred in the following:—

1. Perforation at posterior aspect of 1st stage of duodenum.
2. Perforation of cæcum.
3. Thrombosis of mesenteric veins.
4. Rupture of abscess from appendicular disease.
5. Extensive tuberculosis of mesenteric glands.
6. Malignant infiltration of omentum.
7. Extensive peritoneal cancer.

That every surgeon has a perfect right to his own opinion, and an unlimited license in the expression thereof, is a fortunate circumstance. It is deplorable, however, that a position in the gift of the profession can be utilised for the diffusion of personal views (however well founded) without full and free discussion.

In a brilliant communication to this Section a former President said:—

"As far as my sight reaches I can see no direction in

which the craving for novelty and originality has caused men to overstep themselves more than in the operations undertaken so often and with such a light heart for the relief of some forms of obstruction of the bowel. The hateful expression that '*there is practically no danger in opening the peritoneum*' is ever before the reader in these days, and, as regards a class of cases I wish to speak of, a more false or poisonous teaching was never promulgated."

Without the safe-guards which free discussion would set up around the position taken in the paper alluded to, the views set forth are assumed to have the sanction of the entire profession, and as such they rightly influence the minds of those who have to depend on hospital workers for light and leading in cases of extreme gravity, as all these cases are, in fact and deed. All debatable points are out of place in a communication from a position of responsibility which has its duties to the profession as well as its privileges to the recipient of the honour.

The cases which I desire to bring under your notice make me believe:

1st. That my contention about unquestionable pronouncements is correct; and

2nd. That the statements made with all the semblance of finality are not only incomplete but capable of a construction which has led to fatal consequences over and over again.

That the cases referred to in the communication above mentioned constitute but a small percentage of those demanding surgical interference is proved by the statistics given by Treves, who says that of 1,000 cases of death from intestinal obstruction only 60 were due to fæcal accumulations, while 940 were the result of troubles for the most part removable by exact surgical treatment.

Thus one must see that many of the reported cures by physic are only instances of temporary relief, often from

conditions in which laparotomy would lead to eradication of the disease.

Now the mortality after abdominal section in the pre-aseptic era was 73 per cent.; it is still 68 per cent. How is this to be explained. The answer is given with true American bluntness in Keen and Whyte's excellent treatise on surgery, where we read as follows:—

Keen and Whyte.—"Abdominal section in the treatment of intestinal obstruction has so far been attended by a fearful mortality, owing to the fact that most operations were performed at a time when the patients were in collapse, or when the parts involved in the obstruction had undergone advanced and often irreparable pathological changes."

Treves.—"In genuine cases of acute intestinal obstruction there is so extremely slight a prospect of spontaneous relief that that possibility—which has been exaggerated by imperfect reports of cases and errors in diagnosis—may be disregarded when the question of treatment is considered."

The opinion of Lockwood is referred to in a letter relating to one of the cases which I bring before you, and as it contains some definite views on this subject you will, I hope, pardon me if I quote from it. In reference to an article by Lockwood, in the *Clinical Review* for March, 1896, he says: "The best remark in the communication is—'In hospital practice it is very sad to see the number of cases of intestinal obstruction in which delay has sealed the patient's fate.'" He then continues, "I believe firmly that all doubtful cases of intestinal obstruction should be in the Surgeon's hands, as in nine cases out of ten surgery will save where drugs will kill. Before I knew the advantages of operation my patients invariably died with a pint of olive oil in their bowels, and some were fortunate in not bringing O'Beirne's tube as well to the grave."

This is the opinion of a man who has studied both sides of the question, and few who have any experience will disagree with him.

That many cases of constipation are relieved by enemata I am quite certain. That opium, belladonna, salines and calomel have their uses I do not question, but that any or all of these ever cured a case of acute intestinal obstruction I doubt very much. On the other hand, I am quite convinced that they have often raised false hopes in the hearts of patients and their friends, while deluding the medical attendant into the belief that he was acting fairly by those who entrusted their lives to his keeping. I shall now briefly refer to a few cases which have convinced me of the necessity for vigorous and timely interference in obscure abdominal troubles.

I was recently called to Mayo to see a gentleman who for six days had severe pain and distension of the abdomen. There was a history of his having eaten vegetables, and immediately going off to shoot. He felt severe pain some hours later, and not being relieved by hot punch and turpentine stupes, he obtained the assistance of a medical man, who gave him morphia. Later, two others in consultation ordered belladonna and enemata. When I arrived I found that all the usual remedies had been employed, but without effect. All the recent literature had been hunted up to find some pretext for the avoidance of surgical interference, and to the great delight of the usual attendant he found some authority for doing nothing. The bowels moved on the day of my arrival, but the patient died. I had an opportunity of opening the abdomen, and found it full of dark, foul-smelling serum. The entire colon was dark in colour and covered with grey patches; there was a cancerous stricture at the splenic flexure of colon. How could palliative measures be effectual here?

In December last year I was called to Limerick to see a gentleman who had suffered for some days with abdominal pain and tenderness. The bowels could not be got to act. He had heard with great delight of the possibility of relief without operation, and willingly submitted to procedures ten times as trying and infinitely more disgusting. The end was such as one might expect when physic has occupied the time in which modern surgery could be effective; he died before my arrival, although some scybalous masses had been removed from the lower bowel.

Two months ago I was called to see a lady in the South of Ireland who had been treated for intestinal obstruction for five days. Under the influence of belladonna and opium, and supported by the opinion expressed in the communication alluded to in the opening of this paper, which was read to her by her medical attendant, she flatly refused to be operated on, although I proved conclusively that peritoneal effusion had already taken place. She was convinced that medicine was all-powerful, and I regret that the gentleman who advocated lavage, rather than laparotomy, was more persuasive than I. Forty hours afterwards this lady died, and the Transactions of this Section influence her attendant no more. So at least he declares. I do not object to medical treatment being tried, but I do strongly protest against stimulating men to revert to the do-nothing methods of old, and claiming every case of constipation relieved as one more case of acute intestinal obstruction cured.

A little time ago I was called away from the theatre of St. Vincent's to see a case on the north side of Dublin. On my arrival I learned that the patient had suffered from inguinal hernia for years. Four days before I saw him he had been exposed to cold, and the hernia became irreducible. Then after lying in bed it went back of itself, but still having pain in the abdomen, and the bowels not moving, he con-

sulted a doctor, who called in another on the evening of the third day. On the morning of the fourth day I saw him, and decided that laparotomy was necessary, not to relieve the bowels so much as to wash out the peritoneum. While I was preparing my instruments the bowels acted copiously, but soon after, and before beginning the operation, he died, with all the evidences of sepsis. Evidently what happened here was, that the infected peritoneal fluid which was not absorbed while tension was high and the mesenteric and sub-peritoneal veins were occluded by pressure of the intestinal contents, rushed rapidly into the circulation and produced the rapidly fatal result once the large bowel was emptied.

I have recently had further proof of the danger of leaving peritoneal fluid to be absorbed. After removing a large enterolith from the small intestine I closed the abdominal wound without flushing the abdomen, which contained a light sherry-coloured fluid; three hours after the temperature went up, and at the sixth hour it reached 103·5°. Seeing the patient three hours later I examined the loins, and all dulness was gone, showing that rapid absorption had taken place. At this visit the temperature had fallen to 99·5°, and the following morning it was normal, no further disturbance taking place until recovery was complete.

These fatalities have convinced me that delay is a most serious matter in cases of obstruction, and the great tendency to advocate it is a deplorable evidence of a retrograde movement on the part of some writers of the present day. Indiscriminate laparotomy is not advocated by any surgeon, but the pretended fear of such a development is made a point on which to turn back to the unenlightened teaching of half a century ago, and a platform on which to exploit unfounded theories, the death knell of which has long since sounded in every home of surgical science in Europe.

I would now crave your attention while I bring under your

notice a few of the cases in which I saw the patients before pathological processes rendered cure impossible.

Stricture at Splenic Flexure.

Case I.—This case was sent to me by Dr. Murphy, of Skerries. She had had severe abdominal pain referred to the region of the umbilicus, and for some days there had been no passage of fæces or flatus. She reached St. Vincent's in a state of collapse, and on examination I found the abdomen tense and distended; quick, feeble pulse; tongue dark and dry, and indeed altogether looking as unfit for operation as possible. Assisted by Mr. Tobin, and in the presence of Dr. Murphy, I opened the abdomen in the middle line, and made a digital examination, when I found a dense nodule at the splenic flexure of the colon, and engaging the entire circumference of the bowel, and infiltrating the great omentum. I fixed a Paul's L-shaped tube in the transverse colon, supported it with glass rods on the abdominal wall, dressed the wound, and in a very few minutes after her admission she was in bed. On the sixth day the tube came away, leaving a free opening for fæcal discharge.

This is a procedure of great value in cases of collapse, and however prostrated a patient may be he can be subjected to it without much risk; and when it is necessary, as in old people with irremovable strictures, it is less likely to prove fatal than either lumbar or abdominal colotomy performed by any of the other methods.

It has advantages—

(*a.*) It is very rapid.

(*b.*) It ensures close and accurate approximation of the intestine to the abdominal wall.

(*c.*) The L-shaped tube, being connected with a long rubber tube, discharges the contents of the intestine into a vessel under the bed, and not into the dressings, which are therefore unsoiled.

(*d.*) Healing is rapid, as the wound is unirritated by the discharge of fæces.

The one disadvantage of this method is that there is no

spur formed to prevent the passage of fæces downwards when we desire to make a permanent opening.

Intussusception.

Case II.—This case was sent to me by Dr. Power, of Kildare, who deserves great credit for his early recognition of the cause of obstruction, and his promptitude in dealing with the matter.

The child, thirteen months old, was brought to St. Vincent's Hospital about ten p.m. I happened to be the guest of Dr. Patteson that evening, and, fortunately for me and the child, Dr. Horne was near me. On learning that an operation was necessary, I asked Dr. Horne to accompany me, and at 11 p.m. we saw the child together. I found he had phimosis, which prevented evacuation of the bladder, which was distended. To the left of that viscus, and extending to the left of the umbilicus, we discovered a small ovoid mass, movable and semi-elastic. The napkins were stained with blood and mucus.

Before performing laparotomy I carefully circumcised the child, and emptied the bladder, which contained a considerable amount of urine. After thorough disinfection I made an incision from umbilicus to pubes. I spread warm sterilised towels all round the wound, and allowed the small intestines to protrude freely. This gave me plenty of room to manipulate the seat of invagination, which proved to be in the left ilio-lumbar region. Inversion had taken place at the ileo-cæcal valve. The first thing felt on introducing the fingers into the abdomen was a dense ring to the left and below the umbilicus, and from this downwards into the left iliac fossa; and over left side of true pelvis a firm mass could be felt, as large as a child's arm, and extending well into the true pelvis. This mass was dark in colour. The ring at upper part was grey, but shiny, showing that as yet the peritoneum was safe. Fearing that traction on the gut would endanger the serous coat, I passed my left hand well down into the pelvis, and compressed the tumour so as to free it as much as possible of blood. Then slight traction, aided by compression from below, caused a gradual disinvagination. When completely freed, we found the intussuscepted part œdematous and purple, but still glossy. While supported by warm sterilised towels I irrigated the bowels with boiled saline solution, under the influence of which the dark colour gradually disappeared, and peristalsis commenced. The intestines were now replaced in the abdomen, and the wound closed by a single row of deep sutures and intermediate skin sutures.

On the fifth day I removed one of the deep sutures, which seemed to be cutting through. On the seventh I removed the superficial sutures, and another of the deep ones, and was proceeding to complete the removal of the others when the omentum and a mass of small intestines bulged through the wound. This was a very awkward accident, but—thanks to the aseptic condition of the surgical department in which this case was—I was enabled without infection to return the intestines after irrigating them with boiled saline solution.

I now secured the edges of the peritoneum by a continuous suture. A continuous line of musculo-cutaneous sutures completed the closure of the wound. This little mishap did not seem to affect the child in the least, and on the 10th day after re-suture the child left the hospital for the country in fine health. I have since heard from Dr. Power that the child is stronger than he has ever been. This I presume is due to the circumcision, as, no doubt, the phimosis caused such straining that it interfered with the child's nutrition, as well as being the direct cause of the intussusception.

Constriction by Band.

CASE III.—On January 17th, 1896, I was called to Dundalk to meet Drs. Kearney, Flood and Sellars in the case of Miss B., aged four years, who was suffering from intestinal obstruction. I made a rectal examination under chloroform and found the pelvis filled with a firm mass of small intestines. There was no trace of intussusception. The abdomen was tympanitic, but the liver dulness was present.

There was also an area of dulness and hardness below and to the right of the umbilicus.

No movements of the intestines were to be felt through the abdominal wall. The child was very restless, and the pain was paroxysmal in character. There had been no motion from the bowels since the 12th, although she had had calomel and other laxatives, as well as copious enemata.

I decided to operate at once, and as I came provided with the sterilising apparatus, containing gauze, sponges, dressings, towels, &c., I had only to boil the instruments in soda solution and have the child rendered as aseptic as possible by washing with soap and water, then applying 1 in 500 corrosive sublimate solution.

Operation.—I made an incision two inches in length between

umbilicus and pubes, and passed my index and middle fingers towards the ileo-cæcal part of the bowel. Finding that there was no invagination I proceeded to search carefully for the seat of obstruction, following the colon upwards. As my fingers were turning across through the abdomen, about the level of the umbilicus, they encountered a hard mass near the middle line, the intestine near being tense. By increasing the incision upwards I was enabled to turn out the omentum, and bring the small intestines into view, when I found several coils, dark purple in colour, and greatly enlarged. The enlargement was due to two causes—œdema succeeding vascular engorgement and distension with gas. There was very little liquid or solid contents. The dark coils of intestines were turned out of the abdomen into warm sterilised towels, and on examining the nodule above referred to I found a dense band passing from it round the small intestine, and joining the great omentum on its posterior aspect.

Through the ring formed by the mesentery behind, the colon and meso-colon above, and the omentum and band below and in front, nearly all the small intestines had passed. The constriction by this band and the torsion of the mesentery combined to produce great hyperæmia; œdema and paresis followed.

The band was firm and very vascular, hence I applied a ligature at each end before its removal. The nodule I did not interfere with, as it was so close to the mesenteric border that interference with the blood supply to a section of the gut might follow its resection. After unfolding the intestine, and having the coils spread out on towels boiled in saline solution, I kept up irrigation with the same fluid at a temperature of 105° F., until peristalsis commenced and the colour of the bowel improved; then returning the intestines into the abdomen I closed the wound with stout silk sutures.

The after-history of the case was uneventful, the child making a complete recovery. I saw her during the summer, and she was the picture of health, and in the best of spirits.

Septic Peritonitis.

Case IV.—The next case was brought to me from Skerries, and I do but justice when I commend the strength of character of his attendant, Dr. Murphy, who had the courage to bring him to hospital even in a moribund condition. For five days he had had high temperature, vomiting and abdominal tenderness, and he

was gradually sinking, when, owing to the difficulty of carrying out an operation in his home, Dr. Murphy decided on removing him to St. Vincent's. When I saw him his aspect was bad, his face being pinched, blue, and bathed in a cold perspiration. He was almost unconscious, with a weak, irregular pulse, so rapid that it could not be properly reckoned. His temperature was 96·5°, breathing rapid and shallow. Abdomen distended and generally resonant, except to right of umbilicus, where a dull area, about the size of the palm of the hand, existed. Great blue patches covered the abdomen, the colour not disappearing on pressure. Liver and splenic dulness present.

On examining the rectum I found the small intestines filling the pelvis and very tense; bladder and rectum empty. Pressure on coils of intestines elicited evidences of pain, and feeling that the trouble existed in the ileo-cæcal region I made an incision between umbilicus and pubes. During section of the abdominal wall only very dark blood and then an oily serum was discharged. The sub-peritoneal veins were found thrombosed, and the great omentum, which was of enormous size, was a greyish black, a mixture of fatty nodules and enlarged veins. I fancied I had discovered the cause of obstruction at the hepatic flexure of colon, but on pressure the hard mass felt there pitted, showing it to be fæces passing down along colon. I explored the cæcal region and examined the appendix. When passing my finger from the latter along the pelvic brim I felt a resisting coil of bowel and exposed it, to find that it was dark purple in colour. This was a guide to the seat of trouble. Pushing the omentum and colon up I brought the dark coils of the small intestines through into warm sterilised towels. I continued to withdraw the gut, following it upwards until I reached a part almost normal in colour. The same course was followed with the descending part. The dark colour ended one inch from the ileo-cæcal junction, which, together with the cæcum and appendix, was normal. All this time fluid, the colour of tawny port, was running from the wound and welling up from the pelvis, from which the deeply coloured intestines had been drawn. On examining the bowel more closely patches of grey were found scattered over it, but as the serous coat had not become roughened we decided that re-section was not demanded. The appearance was such as one would expect to find in enteric fever; so having satisfied myself that this enteritis and the peritonitis evidenced by the effusion in

the abdomen were the cause of the serious symptoms, I restored the vitality of the extruded bowel by irrigating with boiled saline solution at a temperature of 102° F., and later 105°. Peristalsis commenced after gentle manipulation of the gut, and I now washed out the abdomen with warm sterile water, and returned the intestines. I now made a small opening above the pubes, passed through this a stout glass drainage tube into the recto-vesical pouch, filled the abdomen with warm neutral-saline solution, and closed the entire abdominal wound.

During the early stages of the operation it seemed as if the patient could not survive, but soon after the hot water was introduced reaction set in.

Immediately the boiled saline solution was introduced into the abdomen a great change occurred. The dusky appearance of the face in great part gave place to a malar flush, the blue lips became red, and the pulse, which could hardly be felt, became full, and by the time he was fit for removal to bed he was bathed in a warm perspiration. The tongue, which had been dark, dry, and fissured, had become moist. He soon regained consciousness, and the evening found him in a fair way to recovery. At the first dressing, six hours after operation, there was some dark-coloured discharge, and about an ounce of brown serous fluid was removed from the abdomen. The glass tube was not removed until the third day, and from that time the progress of the case was favourable, and although he went through a regular typhoid attack recovery was complete.

Acute Colitis (*Cæcum almost Gangrenous.*)

Case V.—On the 9th of June, 1896, Dr. Kilbride asked me to see an urgent case with him at Athy. Mr. —— gave the following history:—For a long time his breath had been fœtid, and he had suffered from hiccough and occasionally vomiting. Three weeks ago, after a dinner of meat, vegetables (cabbage), and beer, he got intense colicky pains, and the abdomen became swollen and slightly tender. A castor-oil draught gave him great relief, and he went to the south for a holiday. On June 5th, after a like meal, a recurrence of these symptoms took place. The bowels could not be got to act, although calomel and castor-oil enemata with long tube and soft rubber tube had been tried. Opium allayed the pain, and when I saw him the abdomen was distended, resonant left and centre, dull along right side; not much intra-peritoneal fluid; pulse full, 84; temperature normal;

face dusky; pupils somewhat contracted; rectum empty and dilated.

We decided that laparotomy was necessary. Assisted by Dr. Kilbride and Mr. Cookman, I opened the abdomen in the middle line; subcutaneous and sub-peritoneal fat enormous. The omentum, which was very fatty, I found adherent all over the right side of the abdominal wall, and to the front of the cæcum. I separated it from the abdominal wall, and then proceeded to free it from the cæcum, when a rush of fœtid serum took place from the right iliac fossa. On exploring this region I found the outer side of the bowel dark purple in colour, with grey patches here and there over it. The meso-cæcum was so short that I was obliged to open the abdomen over the iliac crest. *This I did by pushing my hand well into the abdomen, and making my fingers project in the line of the intended opening. Separating the ring and middle fingers, I passed a stout scalpel through the entire thickness of the abdominal wall. A probe-pointed knife was now introduced, and the opening enlarged to the requisite extent.* The hand was now turned within the abdomen, and the semi-gangrenous cæcum pushed through the wound, where it was fixed by sutures engaging the healthy part. The patch, which showed signs of giving way, was cut off, and the bowel flushed with warm water. The patient soon rallied from the shock of operation, and made a rapid and uninterrupted recovery. He is now at business and in good health.

The method of making the secondary opening is very rapid and safe, and so deserves more than a passing mention. The delay occasioned by direct section and searching for the bowel is very pernicious, and is often the cause of a fatal termination. The hand within the abdomen easily brings to the new opening the portion of the intestine to be dealt with, after serving as a guide to the incision, and as a protection for the underlying structures. As far as I am aware, this procedure has not been recommended heretofore.

Malignant Stricture of Colon.

Case VI.—On June 11th, 1896, I was asked by Dr. James Little to see a case in Molesworth-street, and, with Dr. Bennett, we made a careful examination of Mr. R., aged fifty-four years, whose

history was briefly as follows:—For some time he had suffered from attacks of diarrhœa alternating with constipation, the latter accompanied with left-side pain. For some weeks purgatives, and even enemata, failed to give him complete relief. He had been sent from the country to be under Dr. Little's care, and as enemata, carefully administered, failed to relieve him—the abdomen becoming tense and tender, and the pain paroxysmal—he promptly decided that surgical interference was necessary. The bowels had not been moved thoroughly for more than a week, and there was great tympanites, except at the left loin and inguinal region, which was dull. We had Mr. R. removed to 67 Leeson-street, and prepared for operation. Assisted by Dr. Bennett, and in presence of Dr. James Little, I opened the abdomen in the middle line, and allowed some brownish serum to escape. Then I passed my hand into the left iliac fossa, as we suspected sigmoid trouble. I found that piece of intestine distended and bulging towards middle line, and on exposing it we saw that it was dark in colour and tense. Following it downwards I reached a hard, unyielding mass at the edge of the true pelvis, and extending somewhat downwards. In the exhausted condition of the patient we considered it better to relieve the obstruction at once rather than carry out a resection, and so passing my hand over the sigmoid, and making it project above the crest of the ileum, I cut down, and as in Case V. used the hand within to bring the distended sigmoid into the secondary wound, where I secured it with many sutures *to the skin*. Suture of the central incision, free opening of the bowel, and flushing with boiled water, completed the operation. For some days we had some anxious moments about the case, but from the eighth day things went on favourably, and within a few weeks the patient was about in excellent health, which he still enjoys.

Dr. Bennett, to whose diagnostic skill this patient owes so much, rendered me very valuable aid in carrying out a rapid and successful operation.

Large Enterolith.

Case VII.—Mrs. ——, aged fifty-six years, came under my care on Sunday, January 10th, 1896:—

History.—For over three years she has had frequent attacks of abdominal pain, sometimes lasting a few days, accompanied by

vomiting. Free purgation relieved her as a rule, but about Christmas, 1895, she was confined to bed and passed through a very critical time, very severe pain being felt below the 8th, 9th, and 10th costal cartilages on the right side. Since that time she has had repeated attacks of pain in the same region, always attended by distressing vomiting, which increased the pain.

On Wednesday, Jan. 6th, 1896, she felt as if one of the old attacks was coming on, and took some medicine. On Thursday the pain became intense, and she sent for Dr. Crinion, to whose kindness I am indebted for the following note of the case:—

Present Condition.—Vomiting of dark, foul-smelling fluid continued, causing great distress; her pulse was very easily compressed, 120 per minute; temperature, 99·5°. Face flushed and anxious-looking; tongue brown and furred; abdomen distended and tympanitic. An area of dulness, as marked in the accompanying diagram, existed to the right of the umbilicus, and both loins were dull, but cleared by placing the patient on her side. Rectal examination showed the pelvis filled with coils of small intestine, pressure on which elicited no evidence of pain. There were large, dusky patches over the abdomen, which was not tender on pressure. No coils of intestine could be felt through the abdominal wall; liver and splenic dulness present. Very little urine had been excreted for hours, and the patient was fast approaching a condition of collapse.

I determined on exploring the abdomen at once, and had the parts rendered aseptic and covered with a large corrosive sublimate dressing.

Very little ether was necessary to produce anæsthesia. Scrubbing the skin with ether, then sopping well with 1–500 corrosive sublimate solution, I made an incision four inches in length between the umbilicus and pubes, inserted my hand, and explored the cæcum and colon. Then pushing the great omentum upwards, I dipped my hand well into the centre of the pelvis to turn out the small intestine, when I came upon a hard mass, which I brought out through the wound and found to be contained within the small bowel, about 16 inches from the ileo-cæcal valve. The part of intestine above the mass was dilated and smooth; below it was rugose and contracted—almost like a tape so flattened did it appear. I tried to pass the mass downwards towards large intestine, but failed to move it in the least. On examining more closely the part of the bowel engaged, I observed two dark spots—one near the

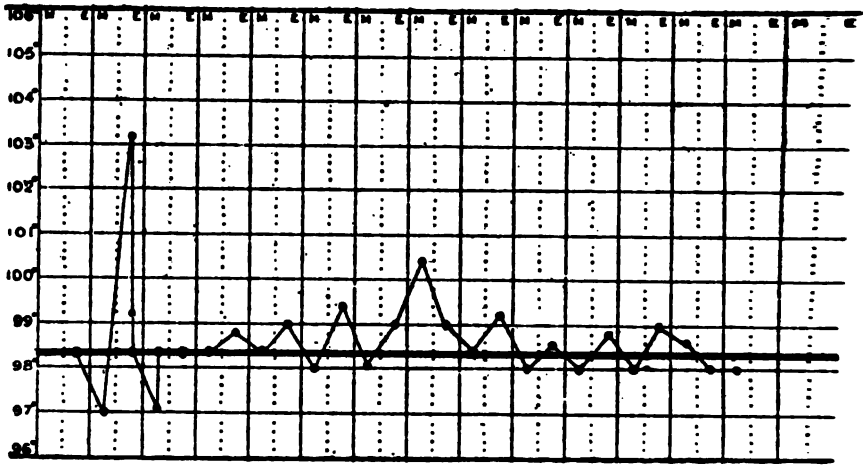
mesentery, and the other on the convex side of the gut. There were patches of recent lymph on the bowel and mesentery here, and a port wine-coloured serum welled up from the pelvis. During these manipulations, fearing that already ulceration had occurred on the mucous surface of the bowel, I desisted from further attempts at pushing the mass downwards, and wishing to cut through sound tissue in carrying out entero-lithotomy, I pushed the mass upwards. It readily moved in this direction, and when it reached healthy tissue I made an incision an inch in length in the long axis of the bowel, and exactly opposite the mesentery. Through this wound I readily extracted the calculus here shown (Fig. 1). The reason

Fig. 1.

it would not pass down was seen at once. The sharp crystalline projections surrounding the thicker end were caught in the mucous membrane, and exciting spasm effectually barred further downward progress. A line of sero-muscular sutures closed the wound of the intestine, which was constantly irrigated with saline solution at a temperature of 100° F. during the operation. Removing the clamps I irrigated the gut for about 10 inches above the wound with saline solution at a temperature of 102° F. This excited peristalsis, and soon the contracted bowel below distended, and gas could be heard passing downwards. The intestines were now gently replaced, and the omentum well drawn down over them. I did not flush the abdomen as is my custom. Deep and super-

ficial sutures closed the abdominal wound, and the patient was put to bed, looking much better than when she was placed on the table.

Vomiting occurred just before removal from the table, and when the patient was settled in bed with warm clothing and hot jars I had the stomach thoroughly washed out with warm boracic solution. From that time no trace of vomiting has appeared. I told my assistants that I would expect a rise in temperature when the contents of the peritoneum became absorbed, and at 8 p.m. the temperature, as shown in chart, reached 103·2° F. In the



First rise commencing morning after day of operation; second removed by purgation.

evening, when I saw the patient, there was no longer any dulness in the loins, the tongue was moist, urine had been voided, but as yet no flatus or fæces had passed, although the abdomen was less tense and had become flat. The pulse was small and quick, but the patient was not restless, nor had she any pain, but as the face looked dusky I ordered a teaspoonful of whiskey to be given in each glass of hot water during the night. Gradual improvement occurred, and in the morning the temperature had fallen to normal.

Nothing of interest occurred until the evening of the 17th—that is,

7 days after operation, when the temperature rose to 100·4°. Although the bowels had acted freely, I ordered 5 grs. of calomel. This caused a copious evacuation, and some hours after the temperature became again normal, and so continued during the remaining days in hospital. This patient left hospital on the tenth day after operation, and she is now in perfect health.

Enormously Distended Gall Bladder, containing 450 Calculi, causing Obstruction.

Case VIII.—This patient came to St. Vincent's with a note from Dr. Ninian Falkiner, to whom I am indebted for a memo. of the case, and to whose kindness and promptitude this patient owes her life. This patient was admitted late on the night of Feb. 16th, 1896. My assistant, Dr. Kennedy, who examined the case, made the following note:—For some years she has had, on and off, attacks of abdominal pain, which usually passed away after purgation. Five days ago this pain set in, but this time the old remedy, magnesia sulphate, failed to relieve the bowels, as did enemata; the pain became more violent, and as it increased it became paroxysmal. From being a girdle pain, it became more marked under the right costal arch, and down to the umbilicus; the abdomen meantime became distended and tense, and over the right side extremely tender on pressure. This condition continued, and Dr. Falkiner ordered her to hospital.

The chief points I noted in this case were jaundice, clammy perspiration, small, quick pulse, paroxysmal pain, and a history of constipation. *Added to this there was marked rigidity of the rectus abdominus on the right side.*

The significance of this rigidity is not sufficiently commented on in most papers on this subject. Whenever I have noted unilateral and continuous spasm of the rectus I have found, on opening the abdomen, either of three conditions—abscess of the liver, hydatid of the liver, or distended and inflamed gall-bladder.

There was no time to be lost, so I immediately opened the abdomen in the right semilunar line, the incision being 4 inches in length. On getting through the peritoneum I found the edge of the liver as low as the umbilicus; the abdominal wall was very vascular, and so also were all the organs inspected. On turning up the edge of the liver I found the gall-bladder enormously distended, and reaching downwards to the level of the crest of the ileum. It was adherent to the abdominal wall. The colon and the great

omentum surrounded it, being closely adherent. With some difficulty I freed the gall-bladder so as to bring it well into the wound, where I held it with forceps. It was evidently full of calculi, and so I opened it freely and flushed it out with warm boracic solution, removing with forceps 450 stones of various sizes. I now, owing to its great size, and the inflammatory condition present, fixed the gall-bladder to the abdominal wall, leaving a large opening to favour drainage and irrigation. Owing to the size of the liver and the displacement of the gall-bladder downwards, I was obliged to fix that viscus at the level of the umbilicus.

The course of this case was uneventful; recovery was uninterrupted. Of course, for some weeks there was a biliary fistula, but soon the motions from the bowel became stained with bile, and the external wound healed soundly.

In each of these cases, and indeed in every case of acute obstruction I have operated on, I found fluid in considerable quantity in the abdomen. Now, the removal of this fluid is of great importance, since in all cases where from obstruction the bowel becomes crowded with micro-organisms there is great danger of the *Bacterium coli commune* reaching any accumulation of nutrient material, such as the effusions which occur in the abdomen, and I have seen death result from septic absorption even when an attack of obstruction has at last yielded to enemata. This recalls to my mind the danger attendant on the reduction of a strangulated hernia in old people when the gut has been constricted for any length of time. Have we not all observed that in many of these cases six to ten or twelve hours after reduction collapse occurs, and before twenty-four hours death ensues, unless the abdomen be opened and well flushed with some aseptic fluid, such as boiled soda solution. Now in these cases in which such procedure has not been permitted I have found the abdomen after death to contain serous fluid in considerable quantity and very fœtid. My reading of these phenomena is this—the strangulation has excited a peritonitis ascending along the intra-abdominal part of the gut, but here, owing

to the blood supply being perfect, the wall of the intestine resists the passage of microbes, and so the fluid poured out is uninfected. Not so with the protruded portion. Here the vessels become engorged, intra-mural exudation occurs, the vitality is lowered, the micro-organisms are now free to invade the coats of the bowel, and multiplying rapidly soon reach the serous coat, and through it the nutrient serum which surrounds it. Now once the bowel has reached this stage, which is often much hastened by taxis, there is grave danger in reducing the bowel without direct examination, not that strangulation continues, but because the infected fluid contents of the hernial sac are projected into a peritoneum full of a nutrient medium in which rapid multiplication goes on, and from which rapid absorption may be expected, and if the vitality be low, owing to age or debility, a rapidly fatal result occurs.

The next point worth noting in most cases of intestinal obstruction is the tendency of the bowel to remain distended, even after the obstruction has been relieved. This I have observed in twenty-seven cases arising from various causes, in all of which I opened the abdomen. I would not call attention to this were it not that I think many failures after laparotomy result from a want of appreciation of the danger attendant on closing the abdomen without exciting peristalsis. Exposure to air often excites contraction of the bowels. When this fails, irrigating them with saline solution generally suffices, but where this has failed I have, before closing the abdomen, washed out the stomach with warm boracic solution, and I have got my assistant to pass a tube well up into the colon, the end being directed by the hand in the abdomen. A syphon is now employed to introduce some quarts of boiled water at a temperature of 100° F. This rarely fails to excite peristalsis. The rectal tube is retained until flatus and fluid escape. Often this will be found useful when, owing

to distension, it is difficult to return the intestines into the abdomen.

A third point of importance in the treatment, after removing the obstruction, is to adopt measures to ensure as far as possible intestinal asepsis. When the bowel has not been incised 3 to 5 grains of calomel should be given twenty-four or thirty-six hours after operation, and where there has been stercoral vomiting the stomach should from the start be washed out every sixth hour with warm boracic solution, or boiled water containing a few drops of iodine tincture.

Calomel is the best intestinal disinfectant. Under its influence the fœtor of discharges soon disappears, and the ashen look of ptomaine sickness gives way to a reaction which precedes the recurrence of normal health.

Nothing tends to bring one to a proper understanding of this subject more than a study of the causes of death in these cases—(1) When the obstruction is unrelieved, and (2) where operation has failed although the bowels have been evacuated.

Old writers, and even men of our own time, have done much to fog our knowledge of this subject—the former, through ignorance of the methods of examination; the latter, either from ignorance or from a desire to obscure the traces of unsurgical procedures. It only serves to retard progress when men wittingly or otherwise cover failure or ignorance by adopting and appearing satisfied with announcing a prominent symptom as the cause of death. What can be more absurd than to say that a patient who has been bled white has died from collapse? Is this condition not the outcome of a copious hæmorrhage which has been the real cause of death? Again, a patient's intestines have been returned into the abdomen chilled by lengthened exposure, without restoring their circulation. The patient weakened by continuous vomiting before operation never really rallies, because intestinal absorp-

tion is absent, and death is said to be due to exhaustion instead of to surgical misadventure. At times we hear that death has occurred on the third or fourth day after laparotomy, and because the temperature was normal for forty-eight hours after operation the procedure is robbed of discredit by using the word inanition instead of sepsis. In a fourth instance, where a plastic operation has been carried out, the patient has remained well until the time when catgut becomes absorbed, silk detached or bobbins loosened; suddenly the quiet of returning health gives way to the nightmare of impending disaster, an incompetent nurse gets irritable because she cannot control the tiring restlessness of her patient, and only when she sees the clammy sweat, and notes the erratic temperature that precedes death, does she realise that the patient is beyond the reach of all things earthly.

In all seriousness, we hear that secondary collapse is the cause of this misfortune. Who that has studied the writings of Madelung, of Billroth, of Czerny, or, indeed, of a host of modern writers, can fail to recognise in these cases examples of perforative peritonitis, arising, as Madelung has clearly shown, from faulty suture material, or imperfect application of one or other of the many appliances used for securing continuity of the bowel?

When will Surgery be freed from the incubus of ancient and misleading expressions, and brought up in some degree to the level of the exact sciences?

We desire to stand between our patients and death, but so long as we delude ourselves by using terms which convey no meaning to the minds of truthful and intelligent observers how can we hope to be of service in hours of great need, when exact knowledge and prompt action indicated thereby can alone point out the road to victory? We must always remember that, however brilliant a surgical procedure may appear, the completeness of its success should be the only

measure of its beauty. We are marching onwards to a position grander than the world has ever seen, more brilliant than our predecessors ever contemplated. Are we to lapse again into the benighted condition which preceded our recent awakening? Are we to go back to the salves and syrups, the cordials and clysters of the past, or are we to trust to our own vigorous minds, strong hearts, and trained hands? Is this march to victory to be checked because a few of the rank and file cry "Halt!" No; triumph is the just reward of those who, having "Excelsior" for their motto, do all things to deserve success, and press always onwards. To those who would cry "Halt!" in our march we say, "Fall out!" The ranks close up, and, when the spoils of victory come to be counted, they but get the straggler's share.

CONCLUSIONS.

Should there be difficulty in finding the site of the obstruction:—

(*a*) Follow engorged coil of intestines upwards and downwards until point of obstruction is reached or turn out all the intestines.

(*b*) Remove all fluid from Douglas' pouch and loins by irrigation with sterile water.

(*c*) Restore colour of bowel, and establish peristaltic movements by heating with neut. sal. sol. The removal of the primary cause of intestinal obstruction is not always followed by relief of the symptoms.

(*d*) Should there be difficulty in returning intestines, elevate pelvis in Trendelenburg's position, or, if necessary, open and wash out.

(*e*) Before all, and above all these conclusions, I would lay down this rule, or formulate this axiom:—"When a surgeon is called to a case of complete obstruction of the bowel, with evidence of peritoneal effusion, it is his duty to operate at once."

The President said he did not think there would be any difference of opinion about the importance of the paper which had been read. Mr. M'Ardle was certainly to be congratulated upon the cases he had brought forward and the surgery he had adopted, but he was sorry he had not dealt with the symptoms or methods by which he arrived at the conclusion that those particular cases were cases for operation, and not treatable by ordinary methods. Granting that acute intestinal obstruction was recognised, everybody was at one with him as to the propriety of operating as quickly as possible. As to what might be called ordinary chronic constipation, if they were quite sure that it was that only with which they had to deal, the idea of opening the abdomen should not be entertained except in very extreme cases.

Dr. Myles thought that anyone who had expressed opinions there had no right to resent their being criticised. Speaking with the greatest deference, he thought the principle most persons would deduce from the paper referred to was that prolonged and patient trial with the long tube, used as a syphon, should be made before any resort to operative interference. The point which he would most gladly see emphasised in Mr. M'Ardle's paper was the extraordinary difficulty of accurate abdominal diagnosis. It was very easy to describe a case *post mortem*; but it was far otherwise when the patient was lying before them collapsed, and the only available history was what was afforded by friends or relatives, or an imperfectly informed practitioner. As to Mr. M'Ardle's suggestion of making a second incision if necessary, and putting the hand into the abdomen, he (Dr. Myles) had frequently done that. Most of his operations for obstruction of the bowel had ended fatally, but perhaps most of the cases that he saw were too far advanced for operative interference to be useful. It should be observed, however, that operations in the country were generally conducted under the most disadvantageous circumstances, for, generally speaking, appliances and skilled assistants were wanting, and very often the condition of the patient was too far advanced for the operation to prove successful; besides, country practitioners, not having the necessary appliances, hesitated themselves to open the abdomen in time.

Mr. Tobin said he had often met with cases of obstruction; and he wished he had had behind him such a definite pronouncement as Mr. M'Ardle had made. Mr. M'Ardle had laid down that where there was obstruction, accompanied with distension of the abdomen

and raised temperature, they should look for the cause of it by opening the abdomen. His statistics showed that the cases of obstruction caused by mere fæcal accumulation were few; but even these were often to be accounted for by some structure. If they applied to all cases of obstruction the rule that they applied in strangulated hernia they would do well. Who now hesitated to do taxis for the cure of strangulated hernia before any serious disturbance had taken place. An early operation in a great many cases of intestinal obstruction would effect a radical cure. The persons who were most afraid of laparotomy were those who began it too late. If it were commenced before peritonitis set in the operator was encouraged. He believed it would soon become the practice to operate at once in all cases where there was complete intestinal obstruction; for even if it should lead to the discovery of an incurable cancerous mass, an artificial anus could be made, and thus the patient would be the better of the operation.

Mr. Croly said that if Mr. M'Ardle's paper had been nothing more than a record of cases, it would have done great good by drawing more marked attention to the subject of acute intestinal obstruction. He (Mr. Croly) had never been more impressed by the similarity which existed between acute strangulated hernia and acute internal strangulation than he was on hearing Mr. M'Ardle's paper; and he concurred entirely with him as to the expediency, in such cases, of early laparotomy. The whole question turned on diagnosis. For his part, he would open the abdomen as a means of diagnosis—in order to see what was there. That was much better in a case of acute internal strangulation than stupes, or leeches, or tubes, or turning the patient upside down and shaking him. He cast no slur on the physicians, but he concurred in the statement that they sometimes took charge of acute intestinal obstruction cases too long. So far as his (Mr. Croly's) experience led him, he was entirely an advocate for early laparotomy as a means of diagnosis in cases of acute intestinal obstruction.

Mr. Alfred Smith said he assisted Mr. M'Ardle in operating on a case sent from Skerries, in which the patient was so bad that it was not necessary to administer ether before the operation; and he was greatly impressed by the remarkable change that was produced in the intestines by the use of the hot saline solution. It was exactly like the recovery from a cyanosed condition of a patient who had been given too much ether, after the ether bag

had been withdrawn from his face. Mr. M'Ardle's experience bore out that of everyone who had anything to do with abdominal surgery, as to the great advantage of saline solutions. In all these cases of intestinal obstruction the possibility of tubal pregnancy should not be overlooked.

Mr. Heuston said there was one point on which he (Mr. Heuston) did not agree with Mr. M'Ardle. The latter seemed to think that there was no such thing as secondary shock. He (Mr. Heuston) believed that after the operation a condition of things sometimes ensued which was a secondary shock, and of which the patient sometimes died. This might or might not result from the giving way of imperfect suturing; but he believed suturing could always be done in such a manner that there would be no fear of its giving way.

Mr. Bennett said what he would particularly emphasise was Mr. M'Ardle's practice of making a secondary opening. He (Mr. Bennett) had seen a good many laparotomy operations, but he was not acquainted with the practice in question until he saw it done by Mr. M'Ardle, and he was then struck with the great facility which it gave for reaching any fixed and unmanageable structure that might exist in the lower part of the colon, close to the sigmoid flexure, and which could not be brought to the mesian incision; and the facility it gave for evacuating or exposing the intestine.

Mr. Lentaigne said he had himself done that very operation of secondary incision precisely as Mr. M'Ardle recommended, and for the very same thing. Mr. M'Ardle had mentioned that in two of his cases the patients had free motions of the bowels before death. That was not like acute intestinal obstruction. He said he performed circumcision in other cases; but it appeared to him (Mr. Lentaigne) that that only added an unnecessary shock, where the desired result might be obtained by dilating the prepuce. However, all surgeons were agreed that in acute cases an early operation was necessary, and that delay was criminal. Mr. M'Ardle had not, however, shown where the line was to be drawn between cases which called for an operation and cases that did not. When volvulus or strangulation by a band could be diagnosticated, neither physician nor surgeon would hesitate about an operation. As to the technique of the operation, there was no difference between Mr. M'Ardle's methods and those which he (Dr. Lentaigne) had seen elsewhere, which included washing out with hot saline solutions, reviving collapse, and stimulating peristalsis.

Dr. Boyd said there were very few physicians coming across acute intestinal obstruction who would be so blind as not to recognise the necessity for operative interference; and all surgeons were agreed that it should be done early. But the rule was to be taken with some restrictions—mere lodgments or accumulations should not be confounded with obstruction.

The President said one or two of the speakers seemed to think that he objected to the views of previous essayists being criticised there. On the contrary he had done it himself, and he hoped to do so again.

Mr. M'Ardle, in reply, said there was no man in the profession for whom he had a greater respect than the writer of the paper to which he referred, or in whose surgical acumen he had greater faith. A definite statement had been asked for as to what cases should be operated on. In most of the cases in which he had operated he did not know what he would find on opening the abdomen; but he did know that the peritoneal cavity contained fluid, that the bowels did not act, that the patient was in a state of collapse, or impending collapse, and that physic could do no good. He did not claim any originality as regarded the practice of secondary section of the abdomen; what he did in that particular case was on the spur of the moment, feeling himself otherwise cornered. Everyone knew that the danger of laparotomy was not great; the danger of not performing it was much greater. It had been said there was no use in operating when a patient was in a state of collapse, but he maintained that it was not too late until after the patient was dead. It was never too late until the patient was almost cold. Dr. Heuston struck the nail on the head when he said that the paper referred to had been misunderstood; and it was with a view of placing it in a proper light that he had referred to it. It was of great value, because it taught two things to practitioners in the country—namely, first, the danger of O'Beirne's long tube; and secondly, the value of siphon distension of the bowel rather than distension by manual pressure. In the one case the pressure employed could be regulated; in the other they did not know what force they were using. As to "secondary shock" he did not know what was meant by the phrase. They could understand attributing death to a thrombus, or a clot in the heart, or to any other specific cause; but "secondary shock" meant nothing. The statistics he had given as to the comparative number of cases of obstruction and of fæcal accumulation showed what scope there was for surgical interference.

SIXTY-ONE CASES OF PARTIAL AND COMPLETE EXCISION OF THE TONGUE.

By W. I. WHEELER, M.D., M.Ch. Univ. Dubl.;
Past President, Royal College of Surgeons;
Surgeon to the City of Dublin Hospital.

[Read in the Surgical Section, January 22, 1897.]

Before referring to the operative measures adopted for partial or complete excision of the tongue, it may not be uninteresting briefly to review the development and anatomy of this organ, to refer to the distribution of its muscular structure, and to mention its arterial and nervous supply.

The tongue is developed in two portions—an anterior and posterior; the posterior, being developed at the junction of the 1st and 2nd branchial arches, is as far forward as the foramen cæcum, the anterior being developed between the mandibular and hyoid arches. The anterior formed and springing from what is termed the tuberculum impar differs in many respects from the posterior, the posterior portion of the anterior development meeting it at the foramen cæcum. This anterior portion of the tongue is divided into two distinct and separate portions by the median raphe, and is separate and distinct at each side of the median raphe.

There are some who would assert that the transverse muscles cross at the tip, but this has been disproved; while the more cautious in assertion state that it has not yet been proven that those transverse muscles do cross at the extreme end of the tongue; while others assert that the stylo-glossus muscles cross at this point. But not only has the contrary been demonstrated by competent authority, but in a dissected tongue, kindly lent me by Professor Fraser from his collection

in the Royal College of Surgeons, which I recently exhibited at the Clinical Club, the termination at their respective sides of the median raphe was obvious.

The arterial supply derived from the lingual artery is worthy of notice, no anastomoses taking place between the two terminal or ranine branches. True, Power, in his work on "The Surgical Anatomy of the Arteries," and other authorities, state that the ranine arteries of opposite sides anastomose, but injecting the artery on one side has not injected the vessel of the other side; and Hyrtl, of Vienna, has demonstrated that they do not anastomose, and has called them end arteries.

The nervous supply is the hypo-glossal, lingual, and glosso-pharyngeal.

This brief description of the anatomical arrangement shows that the anterior portion of the tongue is a double and separate organ, that neither the intrinsic nor the extrinsic muscles cross the raphe, that its mucous surfaces are distinct in character from the posterior portion of the tongue—important knowledge from a surgical aspect. I have myself seen a congenitally-divided tongue in an infant with hare-lip.

The surgical value of this anatomical knowledge appears to me to be primarily twofold—1st, that should one side of the tongue anterior to the foramen cæcum only be diseased, the diseased portion can be completely removed without excising the entire tongue; 2nd, that both the character of the mucous membrane and the situation of that portion of the tongue terminating at the foramen cæcum render it less likely to be primarily affected, and that disease more usually extends from the anterior portion of the tongue, which is far more liable to irritation on account of its situation and the roughened character of its mucous surface. I have never seen cancer attack primarily that portion of the tongue which is posterior to the foramen cæcum except once.

Time will not allow me to enter fully into the various causes of cancer of the tongue—that malady we are all so anxious to combat successfully; but besides the cancer from direct irritation, syphilitic disease appears to be a potent factor.

Some few years ago I communicated to the Pathological Section of this Academy observations upon syphilis as a source and cause of cancer of the tongue. Quite recently I have given Dr. McWeeney a portion of a tongue I removed from a male, forty years of age, who had a marked syphilitic eruption when admitted to hospital, also an ulcerated tongue. The eruption and ulceration improved under medicinal treatment, but the diseased portion of the tongue removed proved to be epithelioma.

Stallard, Virchow, and others attribute the increase in cancer of the tongue to smoking, dram drinking, and rough eating. That these produce cancer directly I very much doubt, but they exercise a very potent indirect effect, tending, as they do, like syphilis, to produce a condition of chronic inflammation of the superficial layers of the mucous membrane, which frequently precedes cancer, and may be said to till the soil for carcinoma.

Nor can it be wondered at that the tongue should be a selected organ for cancer; to me it has been a source for contemplation why it is not more frequently the seat of that disease, on account of its constant contact with broken and carious teeth, which, possibly embedded in tartar, are continuous sources of irritation, and why the malignant growths should invariably, if not always, be of the epithelial type.

Plates and false teeth, and the diseased stumps retained by dentists to afford a better foundation for their work, are not an uncommon cause of irritation and consequent cancer.

Smoking is also a cause of irritation, especially the clay pipe, which produces an excoriated surface on the lingual

extremity. Professor Ludwig has stated that carbonate of ammonia, carbolic and acetic acids, which are present in the products of tobacco smoke, are deleterious, and that their action upon the tongue may set up glossitis or ichthyosis, which is known by every practical surgeon to be one of the causes of epithelioma. Heredity has been stated to be a pre-disposing cause of malignant disease of the tongue, but of this I have no knowledge.

If the causes of carcinoma of the tongue may be divided into pre-disposing and exciting, amongst the pre-disposing age and sex would stand in the first rank. Youth appears to be almost exempt, and only a few cases are recorded in which the patients were less than thirty years. From 290 cases from different authors, 8 only were between twenty and thirty years of age; their exact age is not stated, so that it is not improbable that they were only just under the age of thirty. After 30 years no one seems to be safe from the disease. Out of 61 cases I operated upon, there was not one under forty years of age, and the majority of cases were over fifty-five years, and one only was a female.

I have not alluded to the so-called parasite of cancer described by Dr. Ruffer in England. Dr. Hebb has described similar appearances to those of Ruffer in a fibrous thickening of the omentum.

Within a measurable distance of time a statement has been made that the tongue is sometimes attacked by hard and soft carcinoma. It appears to me that this statement rests only on the foundation of the hardness, or softness, or large size of particular tumours. My experience leads me to believe that the tongue is subject only to the epitheliomatous carcinoma. No part of the tongue is exempt from carcinoma, but I have never seen the posterior portion of the tongue behind the foramen cæcum primarily attacked by cancer, except in one instance, due to syphilitic deposit. In relation

to seat, it must not be forgotten that two carcinomas may be developed at the same time on the same tongue.

Carcinoma of the tongue may appear as a blister, a crack, a fissure, a wart, a tubercle, a nodule, an excoriation. It is not to be understood that cancer desires to assume the appearances of other diseases, but that all these various forms may be productive of and degenerate into carcinoma. There is very sufficient evidence that for a lengthened period any of the above forms may remain in the pre-cancerous stage.

Epithelial cancer is described under different forms—soft, warty, sloughy sore, with jagged edges and hard base; or only as a dense mass which contracts the tissues of the tongue so as to resemble cicatricial tissue.

Clinically, I recognise two forms of epitheliomatous disease on the tongue; one is the flat, the other the penetrating. This division is useful from both a diagnostic and prognostic point of view; for the course pursued by a carcinoma depends much on which of these two forms it happens to be, and also upon the situation.

For, if the disease commences in the dorsum of the tongue it may never reach the neighbouring structures, whereas if the origin is on the border of or beneath the tongue, the floor of the mouth is rapidly affected. In almost every case which I have seen, which commenced as a general soreness or blister, analogous to the non-penetrating, there was rarely contamination of the glands; whereas when the disease originates as a nodule and breaks down, the glands are invariably attacked early. It is by the continuous observance of ulcers of the tongue that an accurate diagnosis can be arrived at, and a satisfactory prognosis. Secondary deposits rarely occur when cancer attacks the tongue. Cancer of the tongue may, therefore, be looked upon as a local disease, imperiling life by its position and not by dissemination,

wearing out the sufferer by excruciating pain, and by the poisonous fluids that are swallowed, relief being obtained only by the administration of morphin and by the division of the gustatory nerve. I divided the gustatory nerve on three occasions; pain was relieved and salivation lessened.

The diseases most likely to be mistaken for carcinoma are—syphilis, tuberculous ulcers, simple warty tumours, simple ulcers, fissures. Time will not permit me to enter upon a differential diagnosis, but I may say that by scraping the surface in doubtful cases and obtaining a microscopic examination, an aid in diagnosis is afforded not to be despised. The rapid and continuous growth of the kindred sciences has made the work of co-ordination less impossible, perhaps, but it has brought with it enormous and ever-increasing demands on the intellectual equipment of those who would seek to grapple with it.

The subjective symptoms in carcinoma are pain and salivation. The latter may not be troublesome until the disease has made considerable progress, whereas the former may be present at the very earliest period of the disease; these symptoms are likewise present in tuberculous ulcers.

To the above symptoms may be added enlargement of the glands beneath the jaw and of the lymphatic glands. The glands may be so large as to be plainly visible, but often have to be sought for and sometimes they are not enlarged at all.

I shall record briefly a few of my cases, epitomised from my case books:—

Case I.—A coachman, aged forty-seven, suffering from lingual carcinoma upon the right side of dorsum of tongue, and extending along right border for about two inches backwards, experienced considerable pain in his right ear, and when taking food there was excessive salivation, also emaciation caused from a disinclination to take nourishment. There was not any glandular enlargement. His oral orifice being very small I had to divide his right cheek as far as his masseter muscle; a suitable gag was used, and his tongue

having been forcibly excluded was divided with the thermo-cautery scissors behind a long needle, which had transfixed his tongue posterior to the disease.

Eighteen months after the operation he had no return. I never heard of him since.

Microscopical report of examination—Epithelioma.

Case II.—A male, aged fifty-three years, carpenter by calling, suffered from carcinoma of tip and left half of his tongue, extending nearly to the foramen cæcum. He experienced excruciating pain, which traversed his left ear and the side of his head. It was relieved by hypodermic injections of morphin.

His left submaxillary gland was enlarged, and much thickening could be felt even below the submaxillary space.

I separated the left anterior half-arch of his palate, and divided the lingual attachments to the floor of his mouth, having previously seized his tongue with the forceps I am in the habit of using. Not, however, having sufficient room, I was obliged to divide his left cheek. I excised the diseased half of his tongue, as in the former case.

In about a fortnight after I removed his submaxillary gland, and tracing downwards the thickened connective tissue I removed three or four enlarged lymphatic glands.

The disease returned in the floor of his mouth, which was removed by a second operation.

No return thirteen months after.

Report of examination—Epithelioma.

Case III.—A gentleman, aged over sixty years, consulted me for an epitheliomatous growth on the right anterior portion of his tongue, extending backwards for about $2\frac{1}{2}$ inches. He did not experience much inconvenience except when he partook of food. There was not any glandular enlargement. It is not difficult to detect glandular enlargement in the submaxillary region if a careful internal and external examination be made. Suffice it to say I removed the growth through his mouth, dividing his tongue with a scissors in the median line and then transversely. Dr. Harley kindly administered ether. Dr. Foot, who was his physician, was present, as also Mr. Stack, his dentist, and the late Dr. Charles Lyster, of Kilkenny. The report of the examination was epithelioma.

He never had a return of the disease. Six years later I was called to see him for intestinal obstruction of about a week's duration. Dr. Gordon saw him with me, and Mr. O'Grady assisted at this operation, which was performed as a *dernier ressort.*

Case IV.—Male, blacksmith, resident in Kilkenny, was afflicted with cancer of the left anterior and left lateral half of his tongue, and suffered from intense pain and profuse salivation, accompanied by a most loathsome fœtor. He came under my care in hospital 18 years ago. There was left side glandular enlargement; the floor of his mouth was unaffected. His left cheek having been divided and the hæmorrhage consequent on such controlled, a long needle transfixed his tongue behind the disease and posterior to which the tongue was removed by means of the thermo-cautery scissors.

Report of the examination of the removed portion was an epithelioma. He healed kindly to cure. In three weeks after I removed the enlarged gland, which had diminished in size, and traced beneath, through the medium of the thickened connective tissue, two or three small lymphatic glands, which I also removed. This patient was treated in St. Mark's Hospital for some affection of his eyes three years ago, when he called at the City of Dublin Hospital, where I saw him; there was no recurrence of the disease in his tongue then—about fifteen years after the operation. He is still alive and well as far as I know.

Case V.—Four years ago I operated on a gentleman in Mespil Hospital, who had a cancerous growth in the centre of his tongue, about 1½ inches from the tip, which originated from a syphilitic deposit. Dr. Harley and Dr. Hadden were present. There was no glandular complication. The disease and almost the entire of the tongue were removed by an ordinary scissors.

In eleven months afterwards a nodule appeared in the anterior portion of the floor of his mouth towards the left side, and slight glandular enlargement in the submaxillary region of the same side. The new growth I removed, as also his submaxillary gland and the lymphatic glands in the neck. There has been no return, now over three years and nine months since the second operation.

Case VI.—Six years ago two sailors presented themselves at the City of Dublin Hospital in the same week, both suffering from carcinoma of the tongue. They were both over forty years of age,

and under fifty, and although no way related were not unlike in appearance and conformation. They were both below the middle height, the address of one was Kingstown, the other North Wall. One (B.) suffered from epitheliomatous ulceration over the anterior two-thirds of his tongue, the floor of his mouth was also implicated. The disease was of thirteen months' duration. The other (F.) suffered from epitheliomatous ulcer on the left margin, an inch behind the lingual tip, of six months' duration. Neither had any syphilitic history. The cause assigned in the first case was being scalded with hot whisky; the cause assigned in the second case, with the deep lateral ulcer, was from chewing tobacco. Both had excellently sound teeth; neither had pain except on irritation; neither had increased salivation; neither had enlargement of the glands or any trace of thickening, nor could any abnormal resistence, either externally or internally, be felt. Both were constitutionally healthy. Both these patients had unusually small oral apertures, very narrow mouths; this, together with a perfect set of teeth, rendered it quite impossible to satisfactorily remove the disease without considerably more room than was afforded through the mouth.

I therefore determined to divide the jaw and lip in median line after the plan of Roux and Sédillot.

The patient B., with the superficial ulceration of his tongue and the diseased floor of his mouth, I operated on with the ordinary scissors, dividing the structures by a series of successive short snips, and his tongue transversely; the ranine arteries were deligated.

As to the second patient, I removed the left half of his tongue well beyond the disease with the thermo-cautery scissors. The divided jaw in each case was brought together by suture. They were discharged from hospital in seven weeks after the operations.

I saw one of these patients a year, the other eleven months, after the operation. There was not any return of the disease. They promised to come back if they were again attacked.

It would be irksome to record individually all the cases and the operations I refer to for partial and complete removal of the tongue, many requiring the osseous structures also to be removed. Suffice it to say, out of 61 operations performed by me for malignant disease, none died from the

effects of the operation, save one, a male, on whom I operated by Köcher's method modified; he died of asthenia. I did not tracheotomise him.

Of the 61 cases, in 29 I believe the disease returned. Many of these operations were performed, not with a view to cure, but merely to relieve, and remove a foul, sloughy, fœtid mass, and thus render existence more tolerable; 22 others I have not been able to trace at all directly myself. I heard indirectly that five were healthy three or four years after operation.

The remaining that I have information of are as follows:—

1. No return 1 year after operation.
2. No return 11 months after operation.
3. No return 13 months after second operation.
4. No return 18 months after.
5. No return 3 years and 9 months after.
6. No return 6 years after. Died of other disease; 73 years.
7. No return 15 years after. I believe now alive.
8. No return 7 months after.
9. No return 3 months after; now in hospital.
10. No return 2 months after operation.

The three latter recorded are too recently operated on to form any definite opinion as to their immunity from disease. One of them is a gentleman operated on in Mespil Hospital in July last. Drs. Harley, Hadden, and Mr. O'Grady were present. The prognosis is favourable in this case, the form being flat epithelioma.

One case is still in hospital, operated on in November last. This was a most unpromising case. He was admitted with bronchitis and purulent urine, and extensive disease of his tongue involving also the floor of his mouth. His left submaxillary gland was enlarged; he was exceedingly weak. He showed a tendency to suppurate superficially in his left

submaxillary space; I opened an abscess in this region, removed the gland, and as the lingual artery was exposed I ligatured it. I removed all the diseased portion of the patient's tongue and the disease in the floor of his mouth. The electric cautery was used.

There is only one prognosis for unoperated lingual carcinoma—death; and a like prognosis for a large number of operated cases. That complete recovery does take place is undoubted, as proved by my cases.

Mr. Heath had patients alive eleven and five years after operations, and similar surgical records are extant. Operations on the tongue and in the mouth usually heal kindly, and this was formerly thought to be due to the sulpho-cyanide of potassium in the saliva, but in a recent discussion upon this subject in the Clinical Club Dr. McWeeney related the reasons given by a French experimentalist, who had made investigation on this subject in the Pasteur Institution. He found that the saliva had no bactericidal power whatever, and that the most virulent cocci were abundantly present in it. He likewise found that the sulpho-cyanide of potassium exercised no anti-bacterial or antiseptic effect in the quantity in which it is contained in the saliva. The cause of the rapidity of the healing process he found to be in the fact that saliva exercised a powerful positive chemotactic influence upon leucocytes, the result being that these cells always appeared in enormous numbers at any solution of continuity in the buccal mucous membrane, and completely encapsuled any microbic focus of infection which might be originating from such a wound. He confirmed this result by rubbing extremely virulent cocci into small abraded wounds in the mouth cavity of guinea pigs, and similar cocci into some portion of the abraded cutaneous surface in control animals. The animals inoculated in the mouth soon recovered, with slight symptoms, whereas in the other set of animals

an intense inflammatory process, often resulting in large abscesses, or even in general infection, was the result. By killing some animals so treated at various periods after the inoculation, and subjecting the inoculated regions to microscopic examination, he was able to make out that the cocci he had rubbed into the wound in the mouth were surrounded by an enormous accumulation of leucocytes very soon after their introduction, and before multiplication had had time to set in. The cocci were mostly found inside the leucocytes, and were obviously undergoing intercellular digestion—phagocytosis. In the case of the cutaneous wounds the collection of leucocytes was much smaller, and the organisms were in many cases enabled to get into the lymphatic channels and set up spreading inflammation.

I have considered it expedient to ligate the external carotid before removing the tongue tonsil and part of the palate, but preliminary ligature of the lingual arteries in excision of the tongue, as recommended by Mirault, is not required; there is no hæmorrhage from the ranine arteries to cause alarm, and as the operation upon the tongue is frequently postponed until the wounds for deligating the lingual vessels heal, the disease in the mouth is increasing and may be infecting the patient. So likewise when the glands beneath the maxilla are removed before removing the diseased tongue, the operation on the tongue is often postponed until the wound made to remove the glands has healed; the longer the foul diseased tongue remains unremoved, the chances of septic contamination increase. True, there are some cases where glands are never contaminated in lingual cancer; in its early stages it is a purely local affection; but in cases where the salivary glands are enlarged, I am convinced that it is better surgery to excise the cancerous tongue first, and after the diseased glands. The submaxillary glands may be enlarged through the connective tissue, or by septic or sympathetic

influences, and when the diseased tongue—the source of irritation—is removed the glands will usually subside a little, and can be more perfectly and completely extirpated, and the connective tissue will be a guide to the lymphatic glands deeper in the neck, where the lymphatics directly communicate.

The proposition to examine all the lymphatic regions for all the lymphatic glands that may be engaged in cancer of tongue is not practical, and savours of inexperience. There is no analogy in clearing out the axilliary glands in cancer of the breast.

Köcher removes the glands at the time of operation. He also recommends a preliminary tracheotomy, which, in my opinion, is as unnecessary a procedure as preliminary ligation of the lingual arteries through fear of hæmorrhage. I have seen only two tracheotomies preliminary to the operations on the tongue, and both cases died. Tracheotomy subjects the patient to an additional operation without any compensation for the consequent loss of strength and power.

The earliest operation on the tongue was by Pimpernelle, who died in 1658, and numerous operations have been performed connected with the names of Louis, Inglis, Cloquet, Langenbeck, Mirault, Whitehead, Nunneley, Paget, Jaeger, Maisonneuve, Syme, Regnoli, Billroth, Köcher, but in truth there is no individual operation suitable to every case of lingual cancer.

When the tongue only is engaged, and to a limited extent, it can be removed through the mouth. When the floor of the mouth is engaged more room will be required.

I have performed nearly all the recent recognised operations for lingual cancer, or modified them. I prefer the thermo-cautery scissors when suitable. It will be found an admirable instrument in the majority of cases of lingual cancer should the disease be not too extensive. The scissors, a gag,

a long needle, ligatures, a scalpel, and a few hæmostatic forceps and sutures are all that is required; there is no bleeding except from the ranine arteries; this is to be encouraged. I never use a ligature through the tongue; the operation can be performed through the mouth, but if further room is necessary the cheek may be split. The tongue is held by a toothed lingual forceps, and the cold blade of the scissors is passed under the surface of the tongue, while the heated blade cuts through the tongue from the upper surface. Just as the ranine arteries are about to be severed, the hot blade is allowed to cool a little in order that the vessels may bleed; they are secured by a hæmostatic forceps, and ligatured. This completes the operation; there is no charring of the structures unless the instrument is too hot. In a large portion of cases this procedure will be found efficient and sufficient.

In conclusion, I would wish to emphasise the necessity for the most careful attention to the condition of the mouth and diseased surfaces prior to and after operation. The strictest cleanliness should be observed; the mouth should be douched and sprayed frequently before the operation, and equal care and supervision should be exercised after the operation. I feel that many cases are lost through septic influences for want of this attention.

I have never found it necessary to dress the mouth with gauze as advised by some. After the operation I have the patient fed partly by the rectum, and through a tube attached to an ordinary feeding-cup, but the greatest care and regularity are given to douching and washing out the mouth.

The following modified table, quoted from Wölfler, is published by Butlin :—

EARLIEST IRREGULAR OPERATIONS.

1 Pimpernelle — died 1658.—Was probably the first to excise the tongue with success.

2 Marchetti — „ 1664.—Extirpated a cancer of the tongue by actual cautery; probably the first recorded extirpation for this disease (*Phil. ac. Med. Observ.*, s. 62).

3 Val. Hoffmann — „ 1692.—Removed a tongue affected with macroglossia.

4 Ruysch — „ 1737.—Excised with a knife and cauterised with a hot iron (*Oper. om.*, Amstelodami, p. 70).

5 Memonista — „ 1737.—Excised with a knife and cauterised with a hot iron (*Oper. om.*, Amstelodami, p. 70).

6 Heister — „ 1743.—Gave the first methodical description of operative treatment of cancer of the tongue (*Chirurgie*, Nurnberg, 1763).

7 Buxdorf — „ 1754.—Excised a true cancer of the tongue with the knife (*In Actis Helvet*, vii., 116, Basil, 1772).

8 Guthrie — „ 1756.—Was, probably, the first English surgeon to excise a cancer of the tongue, using the knife, followed by cauterisation of the cut surface.

9 Louis — „ 1759.—Ligatured a "fungus" of the tongue, and later (1774) spoke at length and clearly in favour of total excision for cancer (*Mém. Acad. R. Chir.*, 1774).

DEFINITELY DESIGNED OPERATIONS.

LIGATURE.

10 Inglis — died 1803.—Introduced ligature of the tongue from the mouth for cancer, the cords being drawn with needles through the tongue and round the tumour (*Edin. Med. and Surg. Jour.*, 1805, p. 34).

11 Major — „ 1827.—Split the organ down centre to apply the ligature to the diseased half from the mouth.

12 Cloquet — „ 1827.—Also split the organ, but introduced the ligature by a suprahyoid incision, and strangled the diseased half (*Arch. gén.*, xii., 511).

WEDGE-SHAPED EXCISION.

13 C. J. Langenbeck — died 1819.—Introduced wedge-shaped excision of diseased part of tongue, with careful suture of resulting flaps (*Bibliоth. f. Chir. u. Augenh.*, 2 Bd., s. 487).

PRELIMINARY LIGATURE OF LINGUAL ARTERY.

14 Mirault — died 1833.—Introduced preliminary ligature of lingual artery to give a clear bloodless field for extensive incisions. He was followed by Roux, and later by Roser (*Archiv. gén.*, vi., 5, 636).

ÉCRASEMENT.

15 Chassaignac — died 1854.—Introduced the écraseur, employing Cloquet's suprahyoid method, and defining it more exactly, *i.e.*, using puncture instead of incision (*Traité de l'écrasem. lin.*, p. 31).

16 Middeldorpf — „ 1854.—Introduced the galvanic écraseur (*Schmidt's Jahrb.*, Bd., 107, 260).

17 Nunneley — „ 1856.—Introduced the suprahyoid use of the écraseur into England, adopting Chassaignac's modification (*Medical Times and Gazette*, 1862).

18 Girouard — „ 1857.—Employed circumpuncture with rods of caustic (*Arch. gén.*, 1857, p. 100).

DIVISION OF THE CHEEK.

19 Jaeger — died 1831.—Was the first to divide the cheek for free access to the tongue (*De Extirp. Ling.*, 1831).

20 Maisonneuve — „ 1858.—Divided both cheeks from angle of mouth for same purpose (*Compt. rend. Acad. Sci.*, T. 57, 831, 1863).

21 Collis — „ 1867.—Reintroduced Jaeger's operation, using the écraseur (*Dub. Quar. Jour.*, xliii., 3, 1867).

DIVISION OF THE LOWER JAW.

22 Roux — died 1836.—Was the first to divide the lower jaw and lip in mid-line, in order to gain free access to the floor of the mouth and tongue (*Maisonneuve's "Thèse,"* p. 146).

23 Sédillot — 1844.—Improved this method by dividing the bone by a serrated cut (*Gaz. des Hôp.*, 83).

24 Syme — 1857.—Divided the jaw in mid-line, and excised with the knife (*Lancet*, 1858, i. and ii.).

25 Billroth — 1862.—Divided the jaw and soft parts at the side in two places, and turned down the flap of skin and bone so formed, replacing and wiring the bone afterwards (*Arch. f. Klin. Chi.*, 1862, 681).

26 B. V. Langenbeck died 1875.—Divided the jaw and soft parts opposite the first molar tooth on one side, in order to gain access to side of the mouth for removal of the tongue, glands, and part of the palatal arch and tonsil (*Benary's "Inaug. Dissert.,"* 1876).

INFRA-MAXILLARY OPERATIONS.

27 Regnoli — 1838.—Opened the floor of the mouth from below by an incision from middle of hyoid bone to chin, ending in another semi-lunar incision along the border of the jaw. The tongue was drawn through the opening and excised (*Bull. Sci. med. Bologna*, 1838).

28 Czerny — 1870.—Modified Regnoli's procedure, forming lateral flaps.

29 Billroth — '71-6.—Modified it still further, extending both ends of the curved incision much farther backwards, and omitting the incision in mid-line (*Langenbeck's "Archiv.,"* Bd. 16, Hft. 2).

30 Kocher — 1880.—Introduced a method of opening the mouth from behind and below the angle of the jaw to reach the base of the tongue, and remove it, with all the lymphatic glands situated there (*Deutsche Zeitschft. f. Chir.*, xiii., 146, 1880).

Dr. Bennett remarked that Mr. Wheeler had directed special attention to the association of malignant disease with tertiary syphilis. The most important feature of his paper was that it exhibited a more hopeful view of the treatment of cancer of the tongue than was usually maintained. Most of them had had sad experience of that disease, and very few had been able to record cases in which, after fifteen years, there had been no return of the disease.

The Vice-President, R.C.S. (Mr. Swan), said he thought that Mr. Wheeler was to be signally congratulated on the fact that he had patients alive 15 years after operation for this disease. But most surgeons would agree with him (Mr. Swan) that cases were occasionally seen which presented all the clinical aspects of malignant

disease of the tongue—viz., the ragged sore with a hard base, the emaciated appearance of the patient and the enlargement of the neighbouring glands, the age of the patient also being that at which cancer commonly occurred—and which were yet not cancer but only simulated it, and got well under a course of mercury. He was not a bacteriologist, but he must say he had no faith at all in the bacteriological evidence that was derived from the scrapings of any sore on the human body. He perfectly agreed with Mr. Wheeler as to the inefficacy of tying the lingual artery, so far as its ligation was supposed to be demanded on account of hæmorrhage in the removal of the tongue. Provided they had an easy access to the mouth they need never fear hæmorrhage in that operation; but if, in the course of removing the cervical glands—which Mr. Wheeler apparently did not approve, although many surgeons did—having regard to the intimate connection between the tongue and the sub-maxillary glands, if he (Mr. Swan) should, in the course of an operation, meet the lingual artery he would ligate it, because that would render inspection of the tongue a little more easy afterwards.

Sir Thornley Stoker said he did not think that the minute anatomy of the organ had any essential bearing on the rude facts they had to deal with in connection with the surgery of this portion of the body. In his (Sir Thornley Stoker's) practice only one question in connection with the causation of cancer of the tongue interested him, and that was its connection with syphilis. He agreed with him that syphilis was unquestionably a predisposing cause of cancer; and he also agreed with the practical remarks of Mr. Swan as to the difficulty of diagnosing many cases of cancer of the organ in question from syphilitic affections. And what was very confusing was, that one of these conditions sometimes ran into the other. Most of them had seen instances of what had commenced as syphilis degenerating into carcinoma. Mr. Wheeler spoke of dividing the gustatory nerve as a means of relieving pain and salivation in cancer of the tongue. He had performed the operation on a good many occasions, and he had not found any marked benefit to result from that proceeding. The gustatory nerve was seldom divided at a time when the nerve was easy of exposure and when the operation was an insignificant one; but when the cancer had infiltrated the floor of the mouth and produced aggravated pains in the ear the division of the gustatory nerve became rather a serious operation. He entirely dissented from the practice of transfixing the base of the

tongue because he believed it to be quite unnecessary. There was a reason for transfixing the base of the tongue in the days when the écraseur was used in the operation, and a needle was put in to prevent it from sliding. But no one would, he trusted, use an écraseur in this operation now. As to the thermo-cautery scissors, he thought it a totally unnecessary and objectionable instrument. In cases which were proper ones for the performance of the operation, perfect command over the vessels was obtained by performing Whitehead's operation and using a clip forceps if an artery began to bleed. He had never found it necessary to divide the cheek; and dividing the lower jaw and opening the floor of the mouth were, in his opinion, bad and unnecessary practices. Complete access could be got to the base of the tongue—in spite even of the small mouths that Mr. Wheeler seemed to have found so common—through the oral aperture by Whitehead's operation and as far back as it was safe for the surgeon to carry that operation. He (Sir T. Stoker) had of late years done no operation except Whitehead's, and he believed it to be the best for removing the tongue in a case of cancer. Other procedures might in certain cases be necessary, but rarely. In the last case he operated on he found it necessary to go so far back that he had to remove the anterior artery of the palate and a portion of the tonsil on one side, and he found no difficulty in doing it by Whitehead's operation. The tongue could, by a pair of forceps—and not by the brutal old practice of a ligature—be drawn so far out of the mouth that the operation was practically an extra-buccal one; and every artery that sprang—there were only four or five—could be secured by a clip forceps and tied. He believed that the practice of operating in hopeless cases of cancer of the tongue was a bad one. He had never, in his long experience, seen a case of a patient dying from suffocation, or from starvation, that could not have been relieved by artificial means. He was in complete accord with Mr. Wheeler, however, as to the deligation of the lingual arteries. Mr. Swan hit the nail on the head when he said that those arteries might be deligated when they came into view in such critical operations as the removal of the jaw, or of the sub-maxillary glands; but in ordinary cases he (Sir T. Stoker) did not believe deligation of the lingual arteries to be either necessary or advisable.

Mr. Tobin said the point upon which he most desired information was the connection between the lymphatic system and the tongue—that is to say, the diffusion of the disease through the lymphatics.

If they had very extensive observations as to what course the disease usually followed, what glands became engaged and what did not, they would be in a better position to undertake more radical operations than they were at present. At present their system of dealing with this disease in the tongue was slipshod compared with what they did in dealing with the disease in the breast. Not very long ago they treated the disease in the breast very much as they at present treated it in the tongue. They removed the diseased breast, and then they attacked the axilla and took it for granted that there were no enlarged glands present; but if there were they removed them and so left the case. But as surgery advanced there was a levelling up to a degree of excellence that had not been attained before. At present the practice in operations on the breast was to remove the lymphatic glands in their continuity with the disease in the breast. They did not make one incision for each, but removed them, as far as possible, in their continuity. Again, they never took it for granted that glands were not enlarged because enlargement was not evidenced to the touch. There were few of them who had opened the axilla and not found enlarged glands in cases of undoubted carcinoma of the breast. As to ligaturing the lingual artery, he had never seen an operation undertaken for ligaturing it in which enlarged glands were not found. On four or five occasions on which he ligatured the artery he found them himself, and he had invariably seen them when others operated. In those cases it was not possible to detect the enlargement by touch. He did not therefore think that mere examination by the fingers was sufficient for the purpose. At present, when scrofulous glands were removed from the neck—in almost every crevice of which glands existed—a string of glands connected with each other was generally removed; and in cancer of the tongue he should like to see an operation of such magnitude undertaken that not only would the diseased tongue be removed—not through the mouth, but through an incision underneath the jaw so that the floor of the mouth and all the structures in their continuity could be reached as far as possible—but also the glands connected with it.

Mr. M'Ardle congratulated Mr. Wheeler on the cosmopolitan character of his paper. But very little information had been given as to what became of the cases in which the disease returned. It had been his experience that where an extensive cancer of the tongue had been removed a fairly early return of the disease took

place; and some guide was wanted as to the possibilities of the return. Where the disease had not returned for 15 years it would be very desirable to have a microscopic section which would indicate the character of the disease at the outset. His experience, in cases in which the diagnosis had been thoroughly established, was that the return took place very much earlier; and if cases were to be of any service they must be accurately watched to the finish. He dissented altogether from the views which had been put forward as to the applicability of this operation in all cases. He congratulated Mr. Wheeler on his conversion to Listerism. The phrase "removal of the tongue" was hardly sufficient for nineteenth-century surgery. It was not sufficiently definite. Removals of the whole tongue, of a patch at the side of it, and of the front of it should be distinguished. If statistics were to be of any use they should be founded on something definite. A cancer engaging the base, on one side of the tongue, bore little or no resemblance to a cancer on the tip of it; and these degrees of affection should not be all classified in a heap. Mr. Wheeler's paper told them how many operations he had carried out; but in his (Mr. M'Ardle's) opinion it told them nothing more of surgical importance. Mr. Wheeler objected to ligaturing the lingual artery, because the healing of the wound on the outside delayed so long the removal of the tongue from within; yet he told them that he left the sub-lingual gland until the wound through which the tongue was removed was healed. Was not that a contradiction? If there was spreading of the disease it must be from the glandular parts and not from the tongue; and the wound made for the removal of the tongue took much longer to heal than the other. Mr. Wheeler said that in one case the patient died from "asthenia." He would like an explanation of what was meant by that expression. He (Mr. M'Ardle) was adverse to the practice of charring the mouth by cautery. The operator saw nothing of what he was doing; he never knew whether he had got beyond the limits of the disease or not; and though the practice in question was the readiest way, it was not the most perfect. If the disease had engaged the base of the tongue, the lingual artery should be secured and a submaxillary incision should be made outside the mouth; for once the base of the tongue had been infiltrated with cancer, the sub-lingual glands must be infected, and it would be impossible to remove them without an external incision. He had never seen the slightest ill effect ensue from the removal of the tongue from outside, and within

the last ten years he had carried out that form of operation a considerable number of times, making an incision down from the angle of the jaw and coming up again. He never did Kōcher's operation except once. When performing the operation through the mouth they should see that every shred of the cancer was removed.

Mr. Lentaigne said he heartily endorsed every word that had been said by Mr. Tobin. In operating for cancer of the tongue they ought always make themselves certain as to whether there were diseased glands or not, and they could effect a careful examination on that point only by making an external incision. Up to two or three years ago they firmly believed in Whitehead's operation; but they did not get to the root of the disease by it, and if there were an extension of the disease to the glands, Whitehead's operation was not sufficient. If he were tempted by a very small cancer at the end of the tongue to perform Whitehead's operation, he would go on to a second operation and search for the glands, especially under the upper portion of the sterno-mastoid, where, in his experience, recurrence most often took place; and if he had any doubt on the subject, he would not hesitate to make incisions on both sides. The statistics of mortality in operations for cancer of the tongue were very high, and some surgeons said that there was no use in operating with the hope of ultimate cure, as the disease would inevitably recur. But Kōcher and others had given a considerable number of cases in which the existence of cancer was undoubtedly proved by microscopic observation, and in which the excision of the glands was performed, and these cases had been followed for many years, and cures or prolonged relief resulted in them. He agreed with Mr. Tobin as to the kind of work they should aim at, and he believed that in a little time they would look on cancer of the tongue as they did when it occurred in the breast or in any other part of the human body, and would feel bound to look for the disease in any place where it was likely to have made a fresh extension. He did not think their knowledge was exact enough as to where the new start was likely to take place, but in the majority of the cases of recurrence in his own and in other persons' practice the recurrence took place in the glands just under the upper portion of the sterno-mastoid. There, he thought, they were bound to make search. He agreed with Mr. Wheeler as to the importance of having the mouth clean before the operation. He thought most operating surgeons did not take sufficient care on that point. The quantity of dirt in the teeth of ordinary hospital

patients was considerable, and therefore the teeth should be well brushed for days beforehand and washed with an antiseptic. A very prolonged course of cleaning was, in his mind, advisable. He agreed that cautery of any kind was objectionable. Clean incisions were far preferable, and he should not think of cautery unless there was some special reason calling for it. He had frequently used adhesive gauze after operations on the tongue, and had found it to be of great use. It protected the cut surface from food, &c., and the healing proceeded in a most satisfactory way under it. He considered that splitting open the cheek was a desirable procedure in a few cases, but any extra buccal operation that did not go down to where there were glands likely to be infected was insufficient and not likely to be satisfactory.

Sir Thornley Stoker said, in explanation, that when speaking of Whitehead's operation he never meant to exclude the practice of external incisions. Although he used Whitehead's operation he could not recollect doing excision of the tongue without making extensive external incisions as well.

Mr. Doyle said that the man who popularised the operation for the thorough removal of cancer of the tongue and all the glands in the sub-maxillary region was Mr. Croly. As to the diagnosis of this disease, of which he (Mr. Doyle) as well as others has had sad experience, it was by no means easy. A late associate of that Society, who had a small white spot near the margin of the tongue, was seen when it first appeared by some specialists of London and other cities, who said there was nothing in it. Three years afterwards it was removed by an operation under cocain. The removed portion was submitted for microscopic observation to another specialist, who could not tell anything about it. Three months afterwards the disease recurred in the sub-maxillary glands and terminated fatally.

Mr. Taylor said diagnosis of cancer of the tongue was in a great many cases difficult; but he did not see why a small portion of the affected part could not be removed and microscopically examined. The results of operation for cancer of the tongue could not be very satisfactory so long as they were without microscopic aid. He considered that the nature of the operation should vary according to the site of the cancer. If it was on the anterior part of the tongue, the operation best suited for that was one from the floor of the mouth, because the glands and cellular tissue could in that way be most easily removed, the diseased part of the tongue

taken away, the lingual artery tied, and good drainage effected. In a case which he had, involving the posterior part of the tongue and part of the tonsil on the right side, he operated from the neck by an incision from the mastoid process. He removed several glands and part of the jugular vein, and a thing which greatly contributed to the ease of the operation was that he cut the posterior belly of the digastric.

Mr. Myles said that quite recently, with the assistance of Sir Thornley Stoker, he operated on a lady for a supposed cancerous tumour of the breast, and as the question of diagnosis was very doubtful he called in a younger colleague, Mr. Greer, who was an experienced microscopist. He made a microscopic examination of part of the tumour, but the result was nil—it was perfectly futile. First, sections prepared under such circumstances were entirely unreliable; and secondly, it was extremely difficult to prepare them. It was difficult to cut a section from a fresh tissue. He therefore contended that microscopic examinations of scrapings, or of fresh sections of the tongue, were absolutely unreliable. Professor Hamilton, of Aberdeen, brought under the notice of the profession the changes that occurred in the tongues of old people, and produced microscopic sections of the tongues of persons over fifty-five years of age, and every one of these presented the identical appearances that were usually associated with epithelioma. He placed side by side with them sections of clinical epithelioma, and the most expert pathologists were unable to distinguish between the two. As to the cases that recovered without operation, when he (Mr. Myles) was house surgeon of Steevens' Hospital, a case came there to be operated on for cancer of the tongue, and everybody, except Mr. Edward Hamilton, diagnosticated it to be epithelioma. The patient was a woman of sixty-five or sixty-six years of age, the mother of 18 children and the grandmother of 24. Mr. Hamilton suggested a mild course of mercury, which was adopted, and she went home perfectly well. He was firmly convinced that in a large percentage of cases it was impossible to distinguish the syphilitic gumma from true epithelioma. He joined issue with those and others who would limit their means of information as to the existence of glandular enlargement to digital explanation. Mr. Wheeler stated that in certain cases, some time after the operation for the excision of the tongue had been completed, he made an incision in the sub-maxillary region and removed the glands. That was not the thorough eradication contemplated by Mr. Tobin and Mr. Lentaigne. A person,

suppose, had a large cancer of the tongue. There was no obvious or visible connection between the cancer and the enlarged glands under the sterno-mastoid muscle. The tongue was removed, and in a fortnight afterwards the glands. But what became of the intervening point of connection? Was it to be left there? Any operation that left the chain of connection between the cancer and the glands was incomplete. On one other point he was entirely at one with Mr. Wheeler's hostile critics, and that was as to the use of cautery. As a means of preventing hæmorrhage it was an antiquated procedure. At the same time he joined issue with those who said that hæmorrhage of the tongue was never sufficient to cause alarm or difficulty. In his own practice, and in that of others, he had again and again seen cases in which there was very considerable difficulty in controlling it. He would go further and say that in an operation for the removal of one half of a tongue the preliminary ligaturing of one lingual artery was absolutely useless so far as controlling hæmorrhage was concerned. In dividing the middle of the tongue he had himself met with very free hæmorrhage from the cut surface.

Mr. Wheeler (in reply) said he never found it necessary on account of danger of hæmorrhage to tie the lingual artery beforehand, and if there was hæmorrhage it could be controlled by passing the finger round the base of the tongue. There was no difficulty at all in controlling hæmorrhage. As to thermo-cautery, he (Mr. Wheeler) was not wedded to it; but he used it for two reasons—one on account of secondary hæmorrhage, and the other because it did not char. It had the advantage of preventing oozing from the surface, but it would be imperfect if the lingual artery were not ligatured. In the electric cautery, secondary hæmorrhage had not been known, but he had used that only once. As to "proper" cases for operation, he considered that where there was a foul and offensive mass in the patient's mouth the removal of it would relieve and comfort him, and perhaps prolong his life, although there might be no hope of curing him. In many of the cases he had brought forward the disease must have returned—it could not possibly have been otherwise. He preferred to remove the tongue first, and the glands afterwards, for this reason, that after the removal of the tongue the sub-maxillary glands, if they were enlarged, went down a little. There was a band of tissue—whether connective or not was a matter of dispute—going from the sub-maxillary glands down to the lymphatic glands,

and guided by that tissue they could find the glands and lift them out more perfectly after the subsidence of the others. It was not so easy with the sub-maxillary glands in a state of tension, or perhaps inflammation, to remove the entire of the glands perfectly, but when they waited until after the subsidence everything could be removed perfectly, and they would not have the disease recurring in the site of the sub-maxillary space. In cases of what was called non-penetrating epithelioma, they would hardly have enlarged glands, and in such cases he had had the best results. He had recorded the history of his cases as fully as he could. There were only 10 that he could account for. In 29 he knew that the disease returned. As to 22, he had no direct knowledge of the disease not having returned, but he heard indirectly that 5 of them were alive. He did not quite understand what was meant by his "conversion to Listerism." In 1884 he wrote a paper in which he stated that cleanliness, rest, and drainage were necessary in operation, and he advocated the same cleanliness in operations on the tongue. As to the case of the man with reference to whose case he used the term "asthenia," he lost hardly any blood, he had an intermitting heart, he got weaker after the operation, and there was no reason for believing that he had thrombosis. As to the operation to be undertaken, it depended on whether they had to remove the tongue, or the tonsils also, or part of the palate; and in the latter cases he had taken out a portion of the inferior maxillary. He wished it to be clearly understood that where the glands were enlarged he not only took out the sub-maxillary glands, but followed down the connective tissue and eliminated the lymphatics. He adopted no half measures in such cases, but in some of his cases the glands were not enlarged at all.

SOME CASES OF NEPHRECTOMY AND NEPHRO-LITHOTOMY, WITH REMARKS.

By T. MYLES, M.D., F.R.C.S.;
Surgeon to the Richmond Hospital, Dublin.

[Read in the Section of Surgery, March 5, 1897.]

Some six years ago I had the honour to bring before the notice of this Section the notes of one of the first successful cases then recorded in Dublin of nephro-lithotomy, remarkable also for the fact that the calculus was the largest removed from the kidney, unbroken, up to that date in Ireland, its weight in the dry state being 282 grains. Since then a fair number of these cases have come under my care, and I therefore considered the present to be an opportune moment to bring some of them under the notice of the Section, and see what changes the intervening six years have produced in the opinions I then gave utterance to.

Case I.—H. W., aged twenty-eight, of good physique and very active outdoor habits, sent to me November, 1893, by Dr. H. F. Powell, of Nenagh, with the following history:—

For the previous three years he had suffered from recurrent attacks of pain in left lumbar region. These attacks were increasing in frequency and in duration of late. At first the pain lasted only for a few minutes; now for a week, or even longer, he suffers excruciating pain, and then, perhaps, has one or two months complete freedom. Vomiting is an occasional accompaniment of the pain, but is not constant.

Of late micturition has been more frequent, but not to any marked degree.

Urine, acid; sp. gr., 1018 to 1022; contains a trace of albumen, but neither pus nor blood. On examination patient is found to be a very healthy-looking, robust man, without the smallest appearance of invalidism about him. No enlargement of the kidney can be felt, and there is very little tenderness on

pressure. At time of examination he was absolutely free from pain.

The difficulties of an accurate diagnosis were explained to the patient, and after a consultation with my colleagues, Mr. Thomson and Sir Thornley Stoker, an exploratory operation was resolved on. The reality of the patient's sufferings was clearly proved by the eagerness with which he begged for an operation, though fully alive to its dangers.

On November 17th, four days after admission, I exposed the left kidney by the usual lumbar incision, and palpation giving a negative result, I thrust a fine needle into the convex margin, and after a little time succeeded in striking it against a calculus. The kidney was now raised from its bed and an incision very cautiously made into the pelvis of the ureter on its posterior aspect. Through this incision, with a little manipulation, the calculus I now exhibit was removed.

The wound was dressed in the usual manner, no attempt being made to close the wound in the ureter. For a few days some blood appeared in the urine, as is usual in these cases, but otherwise recovery was uneventful, and the patient was discharged cured five weeks after admission.

Case II.—E. H., aged thirty-seven, by occupation a carpenter, was admitted into the Richmond Hospital on 3rd October, 1895, having been sent to me by Dr. Malone, of Limerick. This man's case was very interesting. In the previous May he had been first sent to me by Dr. Malone, who correctly diagnosed the presence of a renal calculus.

On examining him carefully I did not feel myself justified in recommending an operation, as his general health seemed good. There was neither pus nor blood in the urine, no tenderness on pressure, and although he had previously had several attacks of renal colic, each attack was followed by the discharge per urethram of calculus *débris*, and on one occasion a calculus the size of a pea, all of which he had carefully collected, and which, in my opinion, seemed to sufficiently explain all his symptoms. Medicinal treatment alone was carried out, and he was discharged from hospital after a short stay. I may add that he was rather hysterical, and very probably this biased my judgment somewhat. He was re-admitted five months afterwards, and his condition then was as follows:—

Pain persistently in left loin, and after micturition at the end of glans penis; scalding pain in urethra; no tenderness on pressure over kidney, no obvious renal enlargement.

Urine, total quantity in twenty-four hours, thirty-five ounces; acid in reaction; pus in large quantity; no blood; no sugar. Temperature normal. General health below par; has lost flesh since last visit.

The only definite phenomena present were the pain in left loin, and in penis, and the presence of pus in acid urine. As a precautionary measure the bladder was carefully sounded for stone, with a negative result.

On the 11th October, eight days after admission, I exposed the kidney in the loin in the usual way, but found the kidney rather less accessible than usual. The calculus was easily felt with the finger, and the diagnosis confirmed with the needle. The stone was in the pelvis of the ureter, which was very thick and tough, so that it had to be cut into freely to allow the finger to enter and grip the stone.

The stone was fairly large, and evidently must have taken some years to attain its present dimension. The subsequent history was not so simple as in Case I. Patient complained of a great deal of pain, and hæmaturia was very marked for four days. He developed also a left pleurisy, which delayed his recovery somewhat. However, notwithstanding all these unpleasant manifestations, he left hospital perfectly well on 23rd November, six weeks after operation.

These two cases may be taken as samples of the simple type of renal calculus without grave complications, and without any difficulty in the operation procedure.

By way of contrast to these I will now detail some cases of a totally different type.

Case III.—G. B., aged forty, labourer, admitted to hospital on 29th March, 1895, with the following history and symptoms:—Twelve years ago had an attack of right hemiplegia, from which he recovered with some weakness in leg. Until a week before admission was working in a bakery; when carrying a basket of bread he slipped and fell, striking his side and left lumbar region against a corner of a wall.

Next day he noticed his urine contained blood, and later on it became turbid. He struggled on at his work for a few days more, but the increasing pain in the side forced him to give it up, and he sought relief in the hospital.

On examination he was found to be a man of poor physique, rather emaciated, with some paresis of right leg. On palpation a distinct fulness could be detected in the left loin, rather tender on pressure, but not markedly so. Has never had an attack of renal colic, but complains of pain in left side, no radiation of pain to testicle or thigh, and no retraction of testicle ever noticed.

His urine was acid in reaction, contained a large quantity of pus, but the notes do not give the sp. gr.

On the 11th April, fourteen days after admission, I exposed the left kidney by the usual lumbar incision. The kidney was large, soft and fluctuating. An aspirator soon demonstrated the presence of pus. The needle opening was enlarged, and the finger entered a large abscess cavity in the kidney. This was douched freely, and a drainage tube inserted. No stone could be felt in the cavity, and no further search was made for one. The patient derived no benefit from the operation. After a few days, notwithstanding the presence of the tube in the loin, pus reappeared in the urine, the temperature began to rise at night, and his general condition began to deteriorate.

After careful consideration I determined to remove the kidney, and, as the organ was very large, an incision in the left linea semilunaris was decided upon.

The nephrectomy was performed on the 11th May, and the removal of the kidney proved very difficult; it was very soft and friable, nodular in surface, and firmly fixed by adhesions to the parietes and adjacent viscera. Bleeding was very free, and was controlled with difficulty. The sac of the abscess was ruptured during the manipulations, and pus escaped into the wound and abdominal cavity. The pedicle was secured in the usual way, and the kidney which I now exhibit removed.

At this stage of the operation the patient developed symptoms of collapse, but under appropriate treatment he rallied, and the wound having been dressed he was removed to the ward. I regret to say that he died twenty-four hours afterwards, apparently from the shock and loss of blood.

On examining the kidney it was found to contain a calculus about the size of a hazel nut, and to exhibit the condition of

pyelo-nephrosis; not one but many pus chambers existed in it. The supra-renal capsule was found to be firmly adherent to it, and possibly the collapse he exhibited was in part due to the unavoidable removal of this important organ.

It will be at once seen that this case differs very markedly from the others I have recorded, and looking back on the result I cannot hold myself quite free from blame.

In the first place, I believe that I should have continued the examination of the kidney for stone after I had opened the abscess cavity. Had I done so, I would assuredly have learned then that the kidney was the seat of many abscesses, and was, in fact, hopelessly disorganised. I need hardly say that the recognition of this fact would have been followed by the removal of the kidney there and then through the lumbar wound, this being enlarged if necessary.

In the second place, when I determined to remove the kidney, I believe now it would have been better surgery to have done it by reopening the lumbar wound, and if necessary carrying it well forward, and then adding a vertical incision three or four inches long to its anterior extremity. This would have permitted a much more easy removal, would have allowed the pedicle to be secured at an earlier stage, and thereby prevented some of the hæmorrhage, and would have allowed of the careful dissection away of the suprarenal body. I believe that had this method been adopted, the patient's life would have been saved, unfavourable though the case undoubtedly was.

The next case I will trouble you with was also a nephrectomy, but happily attended with a different result.

Case IV.—Miss M. G., aged twenty-eight, a shop assistant, was admitted to the Richmond Hospital on the 9th December, 1895, having been sent in by Dr. Winifred Dickson, with the following history and symptoms:—When sixteen years of age was treated for uterine displacement and hysteria. Eighteen months ago, after

running violently to catch a train, she was awakened in the night by a severe pain of a cramp-like character in the right side, followed after some hours by vomiting. This attack, though lasting only four hours, left her so prostrate that she was confined to bed for some days. Since then at varying intervals has had recurrences of the pain and vomiting. Between the attacks she was completely free from pain until six months ago. Now has more or less constant pain of a dull, aching character, increased by exertion, especially by drawing a deep breath, slightly relieved by lying down. She informed us also that she sometimes felt a "lump" slipping up and down in the right side of the abdomen.

On examination patient was found to be a well-built young woman of good physique, and of good general health. A floating kidney was easily felt on the right side, freely movable, pressure on which caused a sickening pain. Urine was acid, sp. gr. 1020, contained no albumen or pus. I may add here that Dr. Winifred Dickson had recognised the floating kidney before the girl complained of feeling the lump, and had ordered her an abdominal belt. When this failed to relieve her Dr. Dickson sent her into my wards.

An exploratory operation, with nephrorrhaphy in view, was resolved upon. The usual lumbar incision was made, and the kidney exposed. On bringing it well into the wound it was seen to be cystic, and a rapid consultation was held as to the advisability of removing it. This was resolved upon, and it was without much difficulty separated from the peritoneum and its own capsule of areolar tissue, the pedicle ligatured by a transfixion ligature, *en bloc*, and the organ removed.

This kidney I now exhibit. There was practically no shock following the operation, but the subsequent history was not devoid of interest; twenty-four hours after operation blood appeared in the urine, which was very scanty, and the temperature rose to 103° F., with a quick, high tension pulse and a dry skin. The patient was very restless, and I feared she was about to have suppression of urine. A small dose of pilocarpine was administered hypodermically, and diaphoresis encouraged by doses of liq. am. acetatis and hot packing. This had the desired effect, and in a few hours a copious perspiration relieved all her symptoms. The total amount of urine secreted was carefully noted.

The operation was performed on the 13th December, and on the

following day only 17 ounces of urine was passed. The next day it was a little over 20 ounces. It gradually increased until on the 19th it was 33 ounces, on the 21st 44 ounces, and on the 22nd 52 ounces. From that on it varied slightly from day to day, the average being about 42 ounces.

The patient soon after left the hospital for the convalescent home, and is now, I am glad to say, back at her business.

Two interesting points present themselves for consideration in this case. The first is—What connection, if any, existed between the mobility of the kidney and the cystic condition present in it? Was the kidney cystic because it was movable, or was it movable because it was cystic? My own idea, which I advance with great diffidence, is that it was cystic because it was movable. One can readily imagine how a floating kidney would at times be so displaced that its outflow might become blocked by kinking of the ureter. Such blocking would naturally raise the water tension within the kidney, and thus predispose to the development of cysts. Or, again, the interference with the circulation which must occur when the kidney moves through a large arc of a circle would tend to produce intermittent attacks of congestion, such congestion in turn producing some connective tissue overgrowth, the contraction of which would cause the cysts, as in ordinary cirrhosis. The microscopic section of this kidney, however, does not show anything like the amount of cirrhosis one would expect if the cysts were due to the cirrhosis.

On the other hand, it is quite conceivable that the mobility of the kidney was due to its cystic condition. The kidney being irregularly enlarged, the projections on its surface were so many points upon which the constantly moving abdominal viscera could act, and such a force, aided by the increased weight of the organ and tight lacing, may have caused the displacement. The point is of practical importance, though it may not seem so at first sight.

If the tendency of a floating kidney is to become cystic, then every kidney which has been floating for some time ought to be removed, and attempts at fixing the kidney, except in the very early stage, would be inadvisable.

On the other hand, if the kidney is already cystic and subsequently becomes movable, then it ought to be removed also, because the attempt to fix it does not remove the cause of its mobility—namely, its irregular enlargement and increased weight. Of course, these are merely points suggested for discussion, and I do not presume to dogmatise on the subject in any way.

The last case with which I will trouble you was the most interesting case of all, because in it the diagnosis was completely at fault.

Case V.—In the month of March of last year I was asked to see a patient by my friend Dr. M'Cutcheon, and for the subsequent error in diagnosis I take complete responsibility.

His history was as follows:—Patient, aged fifty-nine, a working jeweller, of steady habits; some days before I saw him had been attacked with a violent pain diffused over the entire abdomen, but especially marked on the right side. With this was obstinate constipation and some distension, but no vomiting. On examination a swelling was easily felt and seen in the right iliac fossa, extending upwards and backwards along the crest of the ilium, vaguely fluctuating, and tender on pressure, dull on percussion, with œdema of the skin over it. The right thigh was flexed, and extension of it caused pain.

There was no history of any previous renal trouble; his urine was normal, acid in reaction, sp. gr. 1022, contained no albumen and no sugar. His temperature was 101°, tongue thickly coated, and skin slightly jaundiced.

I diagnosed the case as one of suppuration in the cæcal area, probably due to appendicitis, and determined to cut down upon it without delay. This was done on the day after his admission to the Richmond Hospital, and a large abscess opened. The abscess cavity having been washed out, I introduced my finger into the wound to explore it thoroughly, and was rewarded by the discovery of this small calculus.

The case was one of those which have been noticed frequently during the last few years in which a renal calculus gives rise to symptoms simulating those of appendicitis.

The subsequent history was uneventful, and the patient is now back at his usual business.

One other case I will briefly refer to, as it touches upon the all-important question of diagnosis.

Case VI.—J. W., aged twenty-two, was sent to hospital, supposed to be suffering from renal calculus. He complained of shooting pains in left loin, tenderness on pressure, occasional attacks of vomiting, and frequency of micturition. Urine, acid; sp. gr., 1015; contained no pus, and a small quantity of albumen. On examination a distinct fulness was felt in the loin with an obscure sense of fluctuation.

An exploratory operation was carried out by the lumbar incision, and a large abscess opened. The kidney was found to be perfectly healthy, and no stone could be detected with either finger or exploring needle. On further examination, however, the abscess sac was traced up to the spine, probably to the first lumbar vertebra, which was evidently carious. In this case an ordinary spinal abscess had simulated renal disease.

Similar cases have been reported by Erichsen, by Wright, and by Jacobson, but I was unaware of them at the time, and was quite unprepared for the result.

I have made these records as brief as possible, so that I might have more time to discuss some of the general principles underlying the surgery of this region.

The first and most important is the question of diagnosis. What symptoms should lead a surgeon to diagnose the existence of a renal calculus? At first sight this seems an easy question to answer, as the statements in the text-books are very explicit. Pain in the loin, shooting down to the testicle retraction of the testis, vomiting, frequency of micturition, blood and pus in the urine, and local tenderness or enlargement, are amongst the most important. When these

are present the probability is that a renal calculus exists, but they may exist without a renal calculus, and a calculus may be in the kidney without giving rise to them. Let me refer to cases of the latter group first.

In a paper read before the Surgical Section of the College of Physicians in Philadelphia, in October last, Professor J. William White, whose authority will not be questioned by any one familiar with his work, makes this statement:—

"Stone in the kidney, if smooth and embedded in the parenchyma, may give rise to no inconvenience whatever. The autopsy has, in a number of instances, given the first intimation of the existence of a renal calculus."

To those who have not studied the subject this statement will be received with incredulity, but for all such sceptics I have at hand evidence that must convince them.

Through the great kindness of Dr. Henry C. Tweedy I am allowed to refer to a remarkable specimen. It was removed from the body of a man who died in Steevens' Hospital of general tuberculosis. During life it gave rise to no symptoms whatever, and nothing in his history before or after admission to hospital was ever elicited that would lead any one to believe such a serious state of affairs existed in his kidney. The kidney contained several large calculi, its lobules are little more than sacs of caseous *débris*, and evidently it represents a pathological condition which must have been the growth of years. Yet this patient never complained of pain in the lumbar region, nor of tenderness on pressure, though subjected to repeated examinations. Doubtless, during his stay in hospital any trouble his kidney may have caused was probably masked by the more urgent symptoms of general tuberculosis. Nevertheless, I think all will agree with me in saying that this case is in itself ample confirmation of Professor White's statement.

Probably the most reliable phenomena, clinically, are ten-

derness, pyuria, and local enlargement. Hæmaturia is so infrequent that it may be ignored.

Local enlargement or fulness in many cases is absolutely unrecognisable, and always unreliable even when present. Not only may it be caused by conditions outside the kidney, but it may depend upon pathological changes in the kidney other than stone. Twice I have felt what I believed to be a fluctuating swelling in the kidney area, but exploration in both cases showed the kidney to be normal. Tenderness on pressure is of great value when present, but unfortunately in many cases, as in one of those I have recorded to-night, it is completely absent, and its absence is no guarantee that a calculus does not exist.

Pus in acid urine is probably the most reliable symptom of all when it is present. Unfortunately it is not an early symptom, and even when present is not absolutely diagnostic, as it occasionally exists in renal tuberculosis.

It may be said, however, that if the stone is giving rise to no symptoms it is not doing any particular harm, and may well be left alone. When it does give rise to symptoms it can then be attacked by a surgeon. This is a plausible argument, but radically unsound. No one believes that a kidney is physiologically benefited by the presence of a calculus. The longer it is present the more complete will be the disorganisation and the greater the risk of operation subsequently, as shown by statistics. Moreover, a kidney may contain a stone, and yet give no indication of its presence until some slight injury to the organ sets the fire alight, as in the only fatal case that occurred in my practice which I have just detailed to you. For these reasons I think it is of the first importance that an early diagnosis should be made and an operation performed, even though the symptoms are not particularly urgent—in other words, that the operation should be performed before the kidney is wrecked.

The importance of early diagnosis being thus established, one naturally turns to skiagraphy for help.

The question I now propose to touch with a very halting and timorous hand is the possibility of our getting any assistance from the X-ray photography.

At the present moment I have in hospital a patient whom I suspect to suffer from renal calculus. His only symptoms are—frequency of micturition, intermittent appearance of pus in acid urine, and slight pain in the right loin, only present during muscular effort.

Professor McWeeney very kindly made a minute investigation of the urinary deposit for me, and his report is as follows:—

"Urine sharply acid, contains no tubercle bacilli, shows large quantities of oxalate of lime crystals and amorphous urates, mucus in great abundance, few pus cells, epithelial cells from the pelvis of the ureter, and bacteria of two kinds—the *Bacillus ureæ* and the *Staphylococcus pyogenes albus*."

Now here was a typical case for the X-ray to clear up. Accordingly with the help of my friend, Dr. R. Lane Joynt, whose work in this direction is too well known to require any eulogy from me, I on two occasions submitted him to over thirty-minute exposures, but unfortunately with a negative result.

This man is very muscular and athletic, and therefore an unfavourable subject for skiagraphy, so that this failure did not really determine anything, though it did naturally enough engender some degree of doubt as to the possibility of photographing a stone in the kidney. I resolved, therefore, to carry out some experiments on the subject, which I did as follows, Dr. Joynt again assisting me:—

The first experiment was to determine the opacity to the X-rays of various calculi, relatively to each other, and also relatively to some well-known material which might be taken

as a standard. The object we chose as the standard was the human hand.

On a plate, therefore, I placed seven calculi—one, the largest, being an intestinal concretion which I removed by laparotomy from the small intestine of a lady suffering from acute obstruction; another a vesical calculus removed from a man aged seventy-two; and the others renal calculi of various sizes and shapes. Dr. Joynt's hand was then laid on the plate, and a five-minute exposure given.

The result is an excellent one. The numbers at the sides are cut from a sheet of tin, and the uniformity of colour they present is proof of the uniformity of the X-ray action over the entire plate. The photograph showed that the large intestinal concretion is barely opaque, that the large oxalate of lime is most opaque of all; it also shows most beautifully the concentric lamination of the urate calculus. It also shows that a calculus is practically as opaque as bone, as, *à priori*, one would have anticipated from its composition.

The next experiment was to determine if a calculus of known opacity could be photographed in the kidney of a thin subject. Through the kindness of Professor Fraser I obtained a thin female subject, and made the following experiment:—

An incision being made in the middle line the kidney was lifted out, the ureter and kidney cut into, and the most opaque calculus in my collection put into the kidney sinus. The wound was then sutured, the kidney replaced as accurately as possible, and the abdominal wound closed. It will be noted that the stone was placed as far forwards as possible, so that the rays would have to penetrate the largest possible amount of kidney substance, in addition to the overlying liver. Before closing the abdominal wound I thrust a needle from the side through the parietes and into the kidney substance until it touched the stone. Thirty-five minutes' exposure was given.

The stone is easily seen, so is the needle, and the photograph clearly demonstrated that a large calculus in a thin patient can be found by the X-rays. The right kidney was selected for the experiment, as owing to the way in which it is enveloped by the liver it would probably afford the greatest difficulty to the photographer.

I regret that the photographs of the actual patient were not as successful; this of course may be due to the fact that he has not a calculus, but it may also be due on the one hand to his great muscularity, and on the other to a too brief exposure. Mindful, however, of the effects produced in Dr. Drury's case, we did not feel justified in submitting him to more than thirty minutes' exposure on each occasion.

One other aid to diagnosis remains to be mentioned before I leave this part of my subject—namely, needling the kidney from without.

This is a method that is apparently very commonly practised in America, but is not popular here. In these islands there exists amongst surgeons a rooted objection to what may be called "groping in the dark." I have a great deal of sympathy with this feeling, but it is quite possible for us to be carried too far and to dismiss the suggestion of needling without sufficient consideration. Men talk rather glibly of the perfect safety of an exploratory operation even on the kidney, but in my humble opinion exploring a kidney is a very serious undertaking, not to be attempted without the weightiest justification, and if needling can be done safely I would not hesitate to employ it, though I have not yet done so. Before deciding to recommend it, it behoves us first to study the anatomy of the region very carefully, and to weigh the possibilities and dangers of the procedure.

Through the kindness of Professor D. J. Cunningham I am enabled to submit some diagrams and preparations that have for me an interest amounting to fascination, and which

I trust will not be devoid of interest to you. Three diagrams show the position of the kidney as seen in transverse sections through the frozen cadaver at different levels. The fourth is taken from a subject in which the organs were hardened *in situ*, and the kidney and its relations are shown from behind. By a fortunate coincidence Professor Cunningham has been for some time past devoting his attention to this

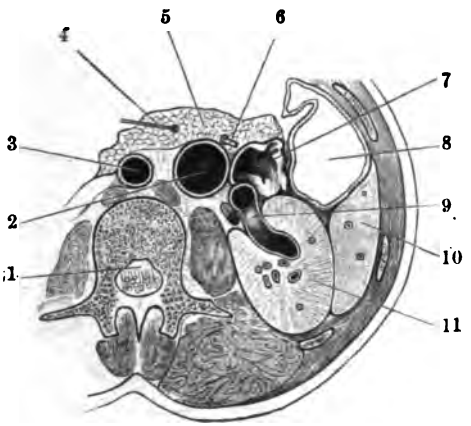


Fig. 1.

Section through abdomen at the level of the second lumbar vertebra.—(From Cunningham.) 1, Cauda equina; 2, vena cava; 3, aorta; 4, pancreatic duct; 5, pancreas; 6, common bile duct; 7, duodenum; 8, colon; 9, renal vein; 10, liver; 11, right kidney.

particular branch of anatomy, and he has very kindly and generously placed his minute knowledge of the subject at my disposal for the purpose of this paper. A study of these diagrams is calculated to make one hesitate before plunging a needle into the kidney from without. Be it noted that very few calculi are found in the cortex of the kidney; the large majority are in the renal sinus either in the pelvis of the ureter or in one of its calices. This being so, look at the proximity of the large blood vessels to the seat of the calculus. Note what a very small interval separates the cava from

the front of the right kidney, and what a still narrower interval separates the pelvis of the ureter from the renal vessels.

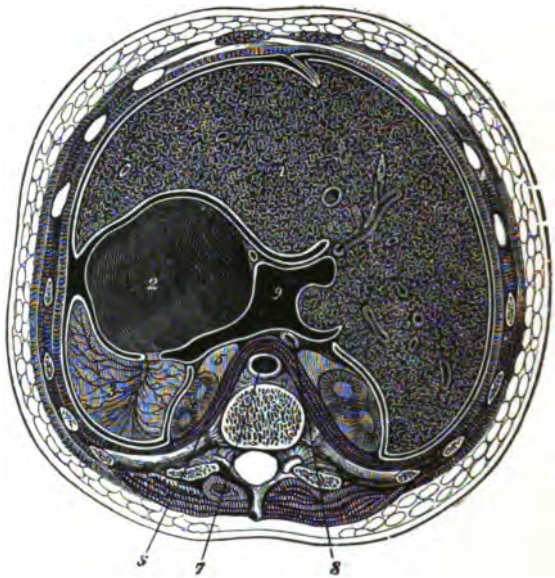


Fig. 2.

Section through the abdominal cavity of a young subject at the upper border of the twelfth dorsal vertebra, above the level of the foramen of Winslow. From this it will be seen that the lobus Spigelii is the only part of the posterior surface of the liver which is clothed by the liver sac. 1, Liver; 2, stomach; 3, spleen; 4, kidney; 5, suprarenal capsule; 6, diaphragm; 7, aorta; 8, vena cava; 9, lesser bag of peritoneum.—From Luschka's "Anatomy."

Again, this photograph of the dissection from behind shows us two very important points.

The first and most obvious is, what a very small amount of the kidney can be seen in the ilio-costal space. The less striking but even more important point is the fact that the pleura dips down as low as the external arched ligament, and the tip of the first lumbar transverse process. The wooden models made by the "reconstruction method" are very instruc-

tive. They show that under normal circumstances the right kidney cannot be recognised by palpation at all through the abdominal wall, as the overhanging edge of the liver completely enfolds it, so that only the tip of the kidney is on a plane lower than this edge.

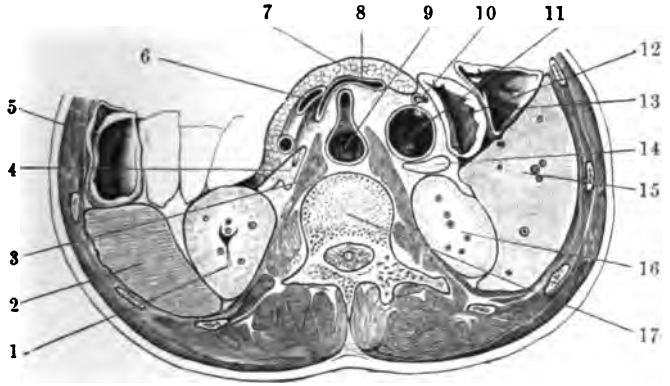


Fig. 3.

Transverse section through abdomen at the level of the first lumbar vertebra.—(From Cunningham.) 1, Left kidney; 2, spleen; 3, crus of diaphragm; 4, suprarenal capsule; 5, colon; 6, splenic artery; 7, pancreas; 8, splenic vein joining the portal vein; 9, aorta giving off the superior mesenteric entry; 10, rod in bile duct; 11, inferior vena cava; 12, duodenum; 13, colon; 14, suprarenal capsule; 15, liver; 16, right kidney; 17, first lumbar vertebra.

The second model shows that when the transverse colon is distended with gas the overhanging edge of the liver is raised from the kidney. These preparations are calculated to raise grave doubts as to the reliability of the statements so frequently made in reports of cases, that "the right kidney was recognised to be slightly enlarged, &c." If these models and diagrams are correct—and Professor Cunningham's reputation removes all doubt on that point—it is obvious that right renal enlargement must be very considerable before it can be appreciated by palpation.

Again, they also show us that we are more likely to get a successful X-ray photograph if the tube is placed not directly over the kidney but to one side of the middle line,

Fig. 4.

From a photograph of a cast of a dissection to show the relations of the kidneys from behind. Organs previously hardened *in situ*. Shows kidneys from behind eleventh and twelfth ribs, arcuate ligaments, pleural reflections, quadrate muscles, and lumbar vertebræ. This preparation, made by Professor Cunningham, shows that the general ideas hitherto held as to the anatomical relations of the kidneys are quite erroneous.

and on a lower plane—to the left for the right kidney and *vice versa*—the plate being fixed obliquely behind so that the rays may fall vertically on it. By this manœuvre the mass

of the liver which offers so great an obstacle to the rays will in part be avoided.

Returning to the question of needling from an anatomical

Fig. 5.

Model of liver and right kidney seen from the front—only tip of kidney is seen between gall bladder and inferior extremity of right lobe of liver. This model was made from a preparation in which the organs were hardened *in situ*. The subject was a young adult who committed suicide by cutting his throat. The hollow viscera were absolutely empty, and anterior abdominal wall retracted, so that the liver is flattened from before backward.

Fig. 6.

Profile view of the same liver and kidney as in Fig. 5, seen from the right side.

point of view, these diagrams and models show us that the tip of the second lumbar transverse process may be regarded

as the anatomical guide to the operation. Above that point there is danger of wounding the pleura, inside that point the vessels of the kidney may be wounded. At a distance of from one-half to three-quarters of an inch outwards from the tip of process the needle will traverse the liver, and at a

Fig. 7.

Model of liver and right kidney from a child aged three, seen from the front. The transverse colon was greatly distended, and the anterior edge of the liver was therefore pushed upwards, so that its vertical diameter was much diminished.

Fig. 8.

Right profile view of Fig. 7. The tip of right kidney reaches a point slightly lower than lowest point of liver. The continuity of surface behind is well shown, as well as the impressions of ribs in liver surface.

slightly lower level the colon. On the left side the space is even narrower, as the kidney, except at its tip, is enveloped by the spleen.

We see, therefore, that the space from which we commence our exploration is very confined. Not only is it confined, but in actual practice it will be difficult to determine. It is impossible, owing to the mass of muscle that covers it, to feel

the tip of the transverse process, the anatomical landmark from which the exploration starts. It can only be approximately located. Let us assume, however, that by careful measurement and palpation we have determined its position, let us next see what we have to avoid. Remember that below the level of the liver and spleen the hollow viscera fill up the interval between the kidney and outer wall; should the needle traverse them, apart from other dangers, it will practically amount to an inoculation of the kidney with the *Bacillus coli communis* and other enterprising organisms.

Assuming that we avoid these dangers, we must now decide to what depth we can safely go. To determine this point accurately an elaborate series of calculations must be first made to determine the ratio between the whole thickness of the body at this level and the distance from the periphery of the renal sinus to the outer surface of the back. Until this is done the exploration will be pure chance and nothing more. The variations in healthy persons are so great that reliable data can hardly be obtained.

Further, at such a depth and in such solid tissues lateral movement of the needle is impossible, so that anything like thorough exploration will necessitate very many separate punctures. I am not in a position to discuss the actual danger of hæmorrhage from these punctures, never having had any personal experience of the method in this connection, but one of the most distinguished physicians in Dublin tells me that he once saw death follow an exploratory puncture of the spleen, the bleeding being uncontrollable. An experience of this kind is calculated to make us hesitate before facing the risk of a similar calamity.

Again, it must not be forgotten that experiments have shown that puncture of one of the arterial arches of the kidney, followed by thrombosis of the vessel, has induced necrosis of portion of the kidney.

Nevertheless needling an exposed kidney has been hitherto looked upon as a harmless proceeding, and it is difficult to conceive why it should be more dangerous in one case than in the other.

The objections to needling may be briefly summarised thus:—

1. The limited space available for preliminary entry of the needle into kidney.

2. The danger of wounding the hollow viscera and inoculating the kidney from them.

3. The danger of wounding the renal vessels or even the cava.

4. The necessity for many punctures to insure thorough exploration.

5. The difficulty of determining to what depth the needle can safely be thrust.

6. The danger of local necrosis of kidney.

Though I have dwelt thus markedly on the dangers of needling the kidney, I can easily conceive it possible that these dangers would be justifiably faced when the much graver operation of exposing the kidney in the loin could not conscientiously be recommended. I await with interest the opinion of the Section on the subject, and confess that should the general trend of opinion be in its favour I should be inclined to give it a trial in an appropriate case. Having said so much on the question of diagnosis, let me now say a word on the method of operating, either when a stone is to be removed or when the whole kidney has to be extirpated.

Let us take the cases of nephro-lithotomy first. In my previous communication, read some six years ago before this Section, I discussed at considerable length the advisability of making a median abdominal section in addition to the usual lumbar incision, the method so strongly advocated by Mr. Knowsley Thornton. I will not recapitulate the

arguments then advanced, which are published in the Transactions of the Academy, and are accessible to anyone interested in the subject, but I have no hesitation in saying that after the additional experience of the past six years in my own practice and that of my colleagues, I feel more strongly than ever that such an addition to the usual procedure is both dangerous and unnecessary.

As to the question of the best site for the incision in nephrectomy, on this point also my opinions have become crystallised into convictions. Three methods claim consideration:—

1. The intra-peritoneal, either through the median line or the linea semilunaris.

2. The extra-peritoneal method, the incision being made through the linea semilunaris, and the peritoneum being raised off the abdominal wall and kidney, after the manner practised in Abernethy's operation for tying the iliac arteries.

3. The lumbar method, with transverse or oblique incision, capable of enlargement in any direction at its anterior extremity.

Let me now review some of the more salient features of these methods. I think we may at once dismiss as unworthy of consideration the incision through the semilunar line, followed by detachment of the peritoneum over a large area. The objections to it are so obvious that it is not necessary to detail them.

The choice, therefore, lies between the intra-abdominal route, the lumbar incision, and the conjoint method. Personally I favour the lumbar incision primarily, followed if necessary by a vertical incision at its anterior extremity, and I do so for the following reasons: —

1. It undoubtedly offers the easiest and shortest route to the kidney.

2. Through it the pedicle can easily be secured before any attempt is made to detach the kidney from its bed.

3. Through it the kidney can be more easily and safely separated from adherent neighbouring organs.

4. If the kidney is the seat of a large abscess, such abscess can be readily and safely drained without danger of peritoneal infection, before any attempt is made to deliver the kidney through the wound.

5. In case a calculus should be impacted in the ureter, unless it be below the pelvic brim, it can be more easily dislodged from the loin than from an abdominal opening.

6. The danger of infection from the exposed end of the ureter is avoided by the lumbar incision.

Against the loin method only one really valid objection can be urged—namely, that a very large kidney cannot be delivered through it. That this may occasionally be true I quite believe, but such cases are rare, and if the enlargement is due to the presence of fluid in a sac, previous tapping of such sac through the loin wound will, in the majority of cases, sufficiently reduce the bulk of the mass to permit of its removal without great difficulty.

Against the anterior route may be urged:—

1. The added danger of peritoneal infection.

2. The difficulty of manipulating the pedicle through a narrow aperture liable every moment to be blocked by rebellious coils of intestine.

3. The great difficulty that exists in detaching the kidney, if adherent, at such depth from the surface.

4. The great liability of tearing the thin-walled renal vein in the necessary manipulations.

5. The possibility of wounding the vena cava, as occurred in Mr. Thornton's case.

I have no doubt that my views will be vigorously traversed. The anterior method at present is very popular—so much so

indeed that an appalling new name has been advised for it. This popularity, I think, may be due to the fact that all abdominal operations of recent years have become much more successful than they used to be, and, illogical though the reasoning may be, it appears as if men hoped to graft the success of laparotomy in general on to the operation of nephrectomy in particular, and thereby diminish some of the dangers attending what must be acknowledged to be a very grave operation.

[The illustrations in this paper are reproduced from the *Edinburgh Medical Journal* for September, 1897.]

The President said he was sure that everyone present considered Mr. Myles' paper both interesting and important. With regard to the question of needling as an aid to diagnosis, he did not believe in sticking a needle into the loin in the hope of finding the kidney or of hitting a stone.

Professor Bennett considered the question of diagnosis of renal calculus of prime importance. It was possible for a calculus to be present without giving rise to any symptoms. He had himself, a few years ago, recorded a case of a man who had died from ascites, and *post-mortem* examination disclosed a calculus in the kidney. He could attest that the patient had never had any symptoms whatsoever of renal calculus.

Mr. Ball said that in experimenting with the X-rays one ought to be cautious in drawing conclusions as to the presence of a stone. From the photographs which Mr. Myles exhibited, it could be seen that some calculi gave photographs like those given by gall stones, which are very transparent. The skiagraph was of no use, he said, in cases of cholesterine calculi. Calculi containing a large quantity of lime or phosphate gave a good skiagraph; but lithic acid was almost as transparent as cholesterine. With reference to palpation as an aid to diagnosis, he considered that it could not be very much relied on. He mentioned a case in which there was a good deal of pus in the urine, but with no definite symptoms of stone. It was discovered that pus was coming from one ureter, and subsequently a considerable

tumour was found on palpating the lumbar region. An incision was made, but efforts to detect a stone were fruitless. The man improved in health, though suppuration continued. Subsequently the kidney was removed, and a stone of considerable size was discovered. Recovery was complete. He referred to another case in which it was thought that gonorrhœal inflammation had spread up the ureter to the kidney. The case became serious, and, on cutting down, the kidney was found to be of considerable size. He drained off a large quantity of pus, and his finger struck a large stone. Such cases, he said, showed the extreme difficulty of diagnosis of renal calculi.

Mr. Tobin thought that no definite rule could be drawn about the position of incision. He considered the anterior incision better if there was no pus in the urine and no rise of temperature. He had seen some very large tubercular kidneys removed through an anterior opening—so large, indeed, were the kidneys that some matter from them could not have failed to get into the peritoneal cavity.

Sir William Stokes said that he had adopted the line of incision to which Mr. Myles objected. He had seen cases in which he thought that he (Mr. Myles) would have adopted the anterior incision also on account of the large size of the tumours. He considered Mr. Myles needlessly apprehensive of peritoneal troubles from the anterior opening. A more satisfactory view, he thought, could be obtained from the anterior opening. He considered the X-rays an important aid to the diagnosis of renal calculus, and they would probably be of much greater aid when brought to perfection. He agreed with the President in his remarks about exploration with the needle.

Mr. M'Ardle thought the X-rays of great value in the diagnosis of calculi. He had experimented with tubes somewhat different from the usual kind, and had found that cholesterine crystals were shown very clearly, so that the question of translucency was of no weight at all. With regard to needling, he had himself practised it as well as passing sutures through the kidney in his first operations on floating kidney, but he had now abandoned the practice as the results had been unfavourable. The question of the floating and cystic conditions of the kidney being present together was a very interesting one. He had formerly shown a cystic kidney with the ureter shaped liked the figure S, and could not be uncoiled. There had been an intermittent discharge of pus for two years. This case bore out the statement that displacement

of the kidney produces such changes as to bring about a cystic condition.

Mr. R. Lane Joynt said that from skiagraphy negative results were sometimes obtained. With reference to the case at present in hospital to which Mr. Myles had referred, the shadows on the first plate, though definite, could not be recognised as any known objects. A second photograph showed the ilium, but not the spine, and was therefore rejected. A third photograph revealed the spinal column distinctly, but no calculus was evident. He therefore concluded that, at all events, an opaque calculus was not present, but that a translucent calculus might be present.

Mr. Myles, in reply.—The case which Professor Bennett had mentioned was further proof that a calculus could be present without creating symptoms. He (Mr. Myles) thought it would be interesting to collect kidneys with calculi in them, and find out the amount of damage done to the kidney in each case. He quite endorsed Mr. Ball's remarks about abdominal palpation, and he had often seen surgeons deceived by this procedure. He hoped that Sir William Stokes did not think that he (Mr. Myles) objected to a vertical incision in addition to the original one; but, hitherto, he had commenced the incision from behind, and believed that there was an advantage in so doing, as in that way he could begin with the retro-peritoneal operation. Mr. M'Ardle had pointed out an advantage in controlling hæmorrhage obtained from the anterior incision. Mr. Myles considered that an open question, as the placing the clamp on the renal vessels had sometimes been attended with great danger.

STRANGULATED FEMORAL HERNIA WITH GANGRENOUS INTESTINE.

By FRANCIS T. HEUSTON, M.D., F.R.C.S.I.;
Senior Surgeon to the Adelaide Hospital, Dublin;
Ex-Professor of Anatomy, Royal College of Surgeons.

[Read in the Section of Surgery, April 2, 1897.]

CASE I.—On March 3rd, 1896, I was asked to see a woman, aged sixty-five years, who had just been admitted into the Adelaide Hospital in an advanced state of collapse, with hiccough and vomiting. She informed me she had an old-standing femoral hernia, which had given her no trouble until February 27th, when it became irreducible, and the existing condition supervened. On examination I found a right complete merocele—tense, elastic, and without impulse.

Immediate operation being decided on, a vertical incision was made over the tumour, when the sac, which contained no fluid, was found to be adherent to its contents, from which it was carefully separated, when the intestine was seen to be black, collapsed, and in an advanced condition of gangrene. The constriction was relieved by dividing Colles' and Gimbernat's ligaments, and the intestine drawn down, when it was found that the gangrene implicated the intestine and mesentery for a considerable distance above and below the part which had been within the sac. To get free of the implicated structures it was necessary to remove over eleven inches of the intestine, and a considerable portion of the corresponding mesentery; the cut edges of the mesentery were united by continuous silk suture, and the intestine by a double row of suture, as described below. I should add that a portion of the great omentum, which had also been contained in the sac and was gangrenous, was ligatured and excised, the sac was then twisted, its neck sutured into the femoral ring, and the remainder removed.

The patient lived three days after the operation, when she died from collapse.

On *post-mortem* examination the intestine was found to be

perfectly united at the line of suture, but for about an inch above this gangrene had supervened.

Case II.—On March 9th, 1896, a female, also over sixty years of age, was admitted to the Adelaide Hospital, at the request of Dr. Katherine Maguire. About a year before admittance she had a severe attack of colic, without any apparent cause, and on consulting a doctor for this, a left femoral hernia was discovered, for which she wore a truss with comfort until three days before admission, when she took two teaspoonsful of Epsom salts; two hours afterwards severe cramps throughout the abdomen came on, and she noticed that the hernia had come down beneath the truss. For this day and the following night she had well-marked diarrhœa, and was seen in the morning by Dr. Maguire, when the pain still continued; the abdomen was tense, there was bilious vomiting, and attempted reduction of the hernia failed. The same afternoon the patient was seen in consultation with a surgeon, the only change in the symptoms then being that constipation had taken the place of the diarrhœa. Full doses of opium were recommended.

The following morning, when I was asked to see the case by Dr. Maguire, the pulse was 68, regular, and of good volume, the temperature was normal, constipation and porraceous vomiting were present, and the pain had practically ceased. The abdomen was distended and tender, especially in the left inguinal region, and the tumour in the left femoral region was extremely tense and had no impulse on coughing. As from the symptoms and history it was evident immediate operation was indicated, an incision similar to that in the former case was made, and, as in that case, the sac contained no fluid, and was adherent to its contents, which were in a gangrenous condition. The constriction, situated at the usual place, was divided and the intestine drawn down, when it was found necessary to remove over eight inches; the mesentery was therefore cut as close to the intestine as possible, and immediately sutured with silk to arrest hæmorrhage, when the intestine was removed and its extremities united by continuous silk suture, the time occupied in removing the intestine and applying the sutures being under ten minutes. The sac was twisted and a strong catgut ligature passed through and round its neck. One end of this ligature was passed through the pubic portion of the fascia lata and pectineus muscle close to the bone; the other end

of this same ligature was passed through the iliac portion of the fascia lata over the femoral vessels and including the deep femoral arch; the sac being then excised the ligature was tied, thus closing the femoral ring.

The more superficial structures were united by buried catgut and the skin by silkworm sutures.

The second night after the operation the patient's abdomen became tympanitic and vomiting recurred, but the administration of Epsom salts causing two movements of the bowels removed the unfavourable symptoms, the further progress of the case to recovery being uninterrupted.

In connection with the treatment adopted in the foregoing cases it is of interest to note the recommendations of the text-books in general use in this country. Thus, Holmes' "System of Surgery" (third edition, 1883) recommends the formation of an artificial anus by allowing the gangrenous portion to slough away, as does also Bryant (fourth edition, 1884) and Gant (third edition, 1886). Druit (twelfth edition, 1887) recommends—(1) excision of the gangrenous portion and suture of the intestine; (2) artificial anus, summing up in favour of the latter. The "Dictionary of Practical Surgery" (Heath, 1888) favours resection of the bowel, while Holmes' "Surgery" (fifth edition), published in the same year, recommends an artificial anus. Erichsen (tenth edition, 1895) suggests—(1) artificial anus (*a*) without removal of intestine, (*b*) with removal of intestine; (2) enterectomy, summing up in favour of the latter. Keane and White (second edition, 1896) give a choice of four methods—(1) resection; (2) fasten the gangrenous portion of the intestine outside the abdominal cavity, and open it at once; (3) if only a small portion is gangrenous return it into the abdominal cavity, and anchor it inside the opening by suture; (4) immediate abdominal section and establishment of intestinal anastomosis above and below the gangrenous portion—recommending the second method to the general practitioner.

Treves's "System of Surgery," 1896, recommends an artificial anus, believing the patient's condition to contra-indicate resection. "Operations of Surgery," Jacobson (third edition, 1897), recommends resection when possible.

From the foregoing extracts it is seen that there is a growing tendency towards resection of the intestine in the cases under consideration, only one of the recently published works recommending the formation of an artificial anus. The reason for this is easily found in the frightful mortality following the older method of treatment, and the great improvement which has been obtained by resection. This is very clearly shown by published statistics, the most comprehensive of which are to be found in a paper read by Mr. Kendal Franks, before the Royal Medical and Surgical Society in 1893, which, although they refer to all the varieties of abdominal hernia, may be taken as sufficiently accurate for any special variety. Of 202 cases treated by the formation of an artificial anus 163 died, a mortality of 80·7 per cent. But even this does not complete the death-roll, as the survivors were further decimated by operations subsequently undertaken to close the artificial anus. Thus Dupuytren's method of destroying the eperon gives a mortality of 7·3 per cent., and fails in its object in 21·9 per cent. Hermann's statistics of 84 cases give 8·5 per cent. Secondary resection and suture has a mortality of 38 per cent. Makins' statistics of 39 cases show 15 deaths, so we may fairly consider the total mortality from this method of treatment as at least 90 per cent. On the other side, of 220 cases treated primarily by resection and suture, 104 died, a mortality of 47 per cent. Bouchard, in a recent report of 100 cases of strangulated hernia treated in Königsburg, states that in 20 cases treated by artificial anus the mortality was 80 per cent. while in eleven treated by primary resection it was only 47½ per cent. With such statistics

before us there is but little doubt as to the operation a surgeon should select whenever practicable, particularly as the methods of performing resection of the intestine are improving, and the mortality is rapidly decreasing—indeed one authority estimates that already two out of every three cases recover. In conclusion, I may state that the method of uniting the intestine I have employed in a fairly large number of enterectomies is by suture, and so far with uniform success. I am thus not in a position, so far as my own work is concerned, to criticise the different appliances which have of late been so extensively employed in connection with this operation. I cannot, however, help stating that I consider it unjustifiable to leave any substance within the intestine which must from its nature act as a foreign body, or give rise to gangrene, and believe that such appliances will not long continue in favour, particularly as I consider the claim that their employment materially shortens the length of the operation to be without foundation. I employ a continuous silk suture, introduced by a curved needle, and commence at the mesenteric border. The needle is introduced through the peritoneal coat, about a quarter of an inch from the cut end of the bowel, and passed at once as deep as the sub-mucous coat in which it is continued to the cut extremity. It is then introduced into the sub-mucous coat at the cut extremity of the other end of the bowel, and continued in this coat for about a quarter of an inch, when it is protruded through the peritoneal coat. By thus keeping the suture in the sub-mucous coat the danger of its subsequently tearing through the different coats is obviated. This suture can be introduced very rapidly, and keeps the different coats in contact at their cut surfaces, at the same time keeping the peritoneal surfaces so well in contact as to materially strengthen the line of union.

REMARKS ON INTESTINAL ANASTOMOSIS BY MEANS OF A NEW PATTERN OF DECALCIFIED BONE RING.

By CHARLES B. BALL, CH.M., F.R.C.S.I.;
Regius Professor of Surgery, Dublin University.

[Read in the Section of Surgery, April 2, 1897.]

ALTHOUGH many methods of joining intestines end to end after resection have been introduced, it can scarcely be said to be as yet settled which procedure possesses the greatest number of advantages; therefore before making a definite choice of any method it is convenient in the first instance to consider the prominent indications which must be fulfilled in order to obtain the most perfect possible result. These may be briefly summarised as follows:—

(1) Sufficient surface of each end of divided intestine should be opposed, in order to obtain a firm bond of adhesion.

(2) No leakage should be possible along the line of union.

(3) No great pressure should be made by the appliance used on the gut outside the junction, which might endanger the vitality of the intestinal wall.

(4) No undue narrowing of the lumen of the bowel should result from the operation.

(5) The method selected should be capable of rapid application; this obviously becomes a question of extreme importance in cases of multiple resection.

(6) In cases where the intestine above the obstruction is much dilated, while that below it is contracted, the procedure should allow of as even and uniform adjustment as is possible with tubes of unequal calibre.

I do not propose to discuss in detail the many methods that have been introduced, none of which to my mind fully fulfil all the foregoing indications. The use of extremely fine needles and interrupted sutures after the method of Lembert, which at first were almost universal, were extremely tedious to apply, and it was almost impossible by these means alone to effect a watertight joint; the same objections apply in a more or less degree to all the methods of suture alone, including the more recent and ingenious method of Maunsell.

The introduction of Murphy's button must be held to mark an epoch in intestinal surgery, and from the ease and rapidity of its application and perfect avoidance of leakage it is a most attractive method, and has largely popularised the performance of these operations. In my own hands it has been attended with most excellent results, but so many cases have occurred of retention of the button, or of extravasation when it is separating, either from insufficient adhesion together of the ends, or from sloughing due to tension of the gut over the instrument, that I have given up its use.

Following the introduction of Senn's plates for lateral intestinal anastomosis, there soon appeared buttons made of decalcified bone or other absorbable material for the purpose of end-to-end junction, which have been employed with more or less success by many surgeons but more particularly by Mayo Robson, and his original pattern of decalcified bone button has been frequently modified, one of the best being that by Mr. Hayes, of Dublin.

I have made a decalcified ivory or bone ring which differs in such essential points from those already in use, and which to my mind so well fulfils all the indications above enumerated, as to justify a special description.

They are made in three sizes, which are sufficient for all

ordinary cases; the centre of each is perforated to allow of the passage of intestinal contents, the upper and lower ends are smoothly rounded off, while round the circumference a deep groove is turned, wide enough to allow involution of the cut edges of the intestine while keeping the peritoneal surfaces in tolerably close contact; a considerable undercutting of this groove provides accommodation for any surplus of involuted intestine.*

The chief feature in the application of this ring, however, is the fact that a continuous lacing suture connecting both portions of intestine is passed loosely through the entire circumference of the divided ends of the bowel before the ring is placed in position.

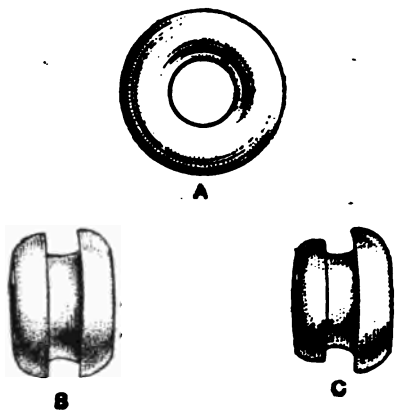


Fig. 1.
A. Vertical view of ring. B. Lateral view showing groove. C. Ring for connecting intestines of unequal calibre.

This suture must be passed with care, and some practice is necessary to make it run smoothly and evenly; it is passed through all the coats of the bowel about one-eighth of an inch from the cut edge. Commencing with the piece

* The rings can be obtained from Messrs. Krohne and Sesemann, London; and Messrs. Fannin and Co., Dublin.

of gut to the surgeon's left hand, the needle is passed through from peritoneum to mucous coat, leaving the free end of the suture hanging from the outside of the bowel. The needle is then entered at the mucous surface of the piece of intestine to the surgeon's right hand; in this way we continue round the entire circumference, always entering the needle at the outside of the left hand piece, and the inside of the right hand piece (Figs. 2 and 3). When

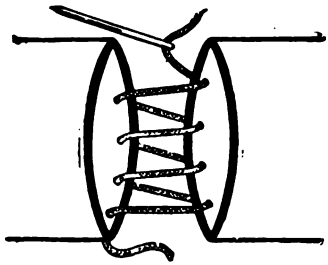


FIG. 2.
The way to commence the first lacing suture.

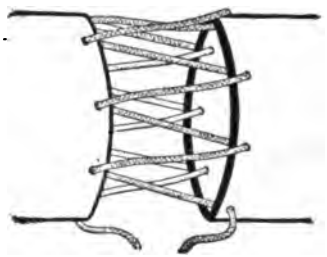


FIG. 3.
The lacing suture completed before introduction of the ring.

the circuit is complete the second free end should protrude from the peritoneal aspect on the right hand side, opposite the first free end on the left hand side. If now a couple of the loops are gently separated the ring can be easily slipped into position, and then by gently pulling the suture

loop by loop, as you would the lace of a boot, it is gradually tightened into the groove of the ring, at the same time drawing in and involuting the cut edges of the intestine. and bringing their peritoneal surfaces into contact (Fig. 4). When all is nicely adjusted the two ends of the suture are

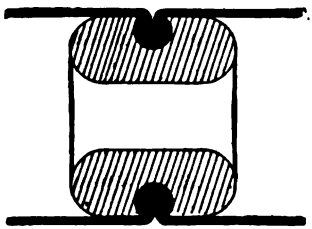


Fig. 4.
Diagram of section showing the ring in position, with involution of the edge of the intestine after tightening the lacing suture.

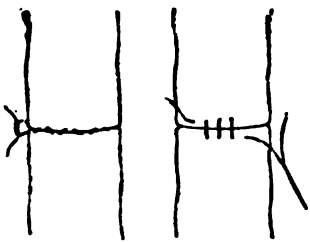


Fig. 5.
The method of passing the external suture through, peritoneal and muscular coats alone.

firmly tied. It is desirable now to pass a second fine continuous suture round the outside through peritoneum alone, where the two surfaces of this membrane are in apposition, the needle should be passed alternately on each side parallel to the line of union, and when the entire circumference is surrounded, the two ends are tied firmly and union is complete (Fig. 5). If the surgeon clearly understands the way the first suture is to be passed, it is possible to effect a union more rapidly by this method than by any

other that I know of, not even excepting Murphy's button, while in accuracy of adjustment and avoidance of leakage it leaves nothing to be desired.

I have had some of these rings made with upper and lower halves of unequal diameter; these permit of the more perfect junction being made between the dilated portion of intestine above the stricture and the contracted portion below, in this way resembling the reducing coupling by which a plumber connects two pipes of unequal diameter. In the majority of cases of obstruction I believe this is the best pattern to employ. An obvious use of these rings will be to connect the ileum with the ascending colon in cases of excision of the cæcum.

The following four cases in which I have used these rings illustrate their applicability to different portions of the intestinal tract; they all occurred last year.

Case I.—W. M'G, aged fifty-seven admitted to hospital, April 2, 1896. He had a history of intestinal obstruction for a month, which one week before admission had become complete. He had an extreme amount of meteorism, his abdomen being very tense and hard, while stercoraceous vomiting was constant. His condition obviously precluded immediate laparotomy, so an intestinal drain was made by Greig Smith's method, using only local anæsthesia, and without removing the patient from bed; this gave exit to a large quantity of fluid fæces and flatus, and his condition rapidly improved, his urgent symptoms quickly subsiding. On April 15 (eleven days after the drain had been made) his abdomen was opened and a ring-like stricture of the sigmoid flexure completely occluding the lumen of the bowel was found; this was excised, and the ends brought together with a Murphy's button. On the eleventh day subsequently, the button was passed, and except for a fistula at the point of drainage, the patient was well. Although the bowels continued to act quite normally, the fistula, contrary to my previous experience of such cases, refused to heal, and a prolapse of mucous membrane through it occurred. Consequently, two months subsequently (June 17) an attempt was made to close the fistula, but finding the bowel

much contracted at the opening, a second resection was performed, the ends on this occasion being brought together by means of the ring that I have described. The remains of the ring passed on the eighth day, and the patient rapidly recovered completely, and remains well and free from any recurrence.

Case II.—A. W., aged twenty-four, admitted to hospital May 6, 1896, suffering from a malignant stricture of the rectum of six months duration. The stricture was situated high up, being only just within reach of the finger, while its upper limit could not be determined. As, however, it was freely movable, it was excised by removal of the coccyx and last bone of the sacrum, the upper and lower ends of the rectum being brought together by means of one of the rings. The remnants of the ring were found loose, and removed through the anus on the eighth day. A small fistula formed at the posterior portion of the line of junction; this, however, closed spontaneously, and the patient recovered completely with good restoration of the function of the bowel, and was discharged from hospital, July 21, 1896.

The rectum is the most difficult portion of the intestinal tract in which to obtain end-to-end junction. In the first place, it is not completely surrounded by peritoneum, and so the surfaces are not as adhesive as in other parts. Secondly, the more solid fæces in the lower bowel put a greater strain on the newly-united tissues, while the very considerable effort necessary to dilate the anus almost certainly forces some of the fæces through the delicate adhesion. This is all the more likely to take place if the usual method of keeping the bowels confined for several days after operation is adopted.

Case III.—Female, aged sixty, had suffered from abdominal symptoms with increasing constipation for about one year. She had lost flesh, and a freely-movable tumour, about the size of a hen's egg, was to be felt in the right hypochondrium. Laparotomy was performed, September 26, 1896, and the tumour was found to be in the transverse colon. A considerable piece of the colon had to be excised, and with it of course the attached great

omentum. The divided ends came nicely together, and were attached by means of a ring. The case progressed for a week most favourably, with no untoward symptoms whatever; the bowels acted quite naturally on the fifth day, but on the seventh, after the wound had quite healed, she suddenly became collapsed, and died in three hours, her symptoms being cardiac and not abdominal. As no *post-mortem* examination was obtained, we cannot definitely say what the immediate cause of death was, but I am, however, confident it was not the result of giving way of the united intestine.

Case IV.—M. B., aged forty-five, was admitted to hospital on December 21, 1896. She had a considerable right femoral hernia, which had been strangulated forty-eight hours. As was suspected from her symptoms, we found on opening the sac that the intestine was in a state of gangrene, dark green in colour, with fœtid fluid in the sac. Instead of relieving the stricture in the usual way, I incised the tendon of the external oblique muscle of the abdomen directly above the neck of the sac, and then, by cutting through Poupart's ligament, relieved the stricture; the gangrenous intestine was then excised. The intestine above the strangulation was fully twice the diameter of that below, and consequently a ring which fitted nicely the upper part could not be introduced into the lower. I therefore pared away with a knife the lower portion of the decalcified ring until it fitted without strain and completed the junction; after thorough cleansing of the peritoneum the gangrenous sac was dissected away, and the neck stitched to the upper angle of the wound, the divided Poupart's ligament being closed by a suture. As some thin fæces had escaped into the abdominal cavity, I thought it safer to introduce a drainage tube. Recovery was as rapid as in the most ordinary case of strangulated hernia, and the patient is now back in her former situation as a cook, as well as ever. She has, however, a slight tendency to hernia along the track of the drainage tube, but Poupart's ligament and the femoral ring are perfectly sound.

In this case the difficulty of adjusting the dilated intestine above to the contracted bowel below, suggested the idea of having the rings made with the upper and lower halves of unequal diameter, and I am convinced that

this alteration of the pattern is a very great improvement. The method adopted of relieving the stricture by cutting directly through Poupart's ligament instead of incising Gimbernat's ligament is, I believe, the rational way of treating strangulated femoral hernia; I know it is opposed to one of the surgical dogmas we were all taught, but the advantages of dividing a strangulation from without instead of from within are obvious. The division of Poupart's ligament does not weaken the abdominal wall any more than an incision in any other part of the abdomen, while the suturing together of the ends of this ligament beneath the neck of the hernia effectually closes the femoral ring in a way that is otherwise impossible. In this particular case, if the old operation had been performed it would have been necessary to have opened the abdomen above as well to complete the resection, as it would have been impossible to have returned the sutured intestine through the femoral ring without injury.

Mr. Lentaigne advocated resection in gangrene. He believed Mr. Ball's button to be one of the most rapid means obtainable of procuring safe anastomosis, but would not say it was better than Mr. Hayes' method. He differed from Mr. Heuston in recommending the suture in all cases. Suture of the intestine without a button was often too slow. He thought Mr. Ball's method was better than Murphy's. It was a fact that many Murphy's buttons had been passed successfully, but many accidents had also happened.

Mr. M'Ardle said he had seen Mr. Murphy operate, and he could assure them that half the time occupied by Mr. Ball had not been occupied by Mr. Murphy in placing his button. With regard to the subsequent occurrence of strictures, these had not yet had time to occur in Mr. Ball's cases; but how did they know that strictures would not occur? He considered Murphy's method invaluable. Failures from the use of Murphy's button had occurred, and arose from imperfections in the suture giving rise to leakage, or from some spring having given way. Other failures had been the result of

putting Murphy's button in improper situations, or from using a button of improper size. Dr. Heuston had said that he had had uniform success by one method, but he (Mr. M'Ardle) did not know of uniform success by any one method.

Mr. Myles said he thought that a false analogy was often drawn between operations for resection of the bowel and strangulated hernia and the operations for resection of malignant disease of the bowel causing obstruction. He considered Mr. Heuston's statistics unreliable; and as gangrene of the intestine might occur in a young man or in an elderly person, or the gangrene might be got in an early or late stage, surely these cases could not be put together for statistical purposes; but, nevertheless, all these cases had to be brought together. Where the gut had been fixed to the abdominal wall, and an artificial anus made, the re-establishment of the bowel was very difficult. He was prepared to acknowledge that Mr. Heuston's cases, when compared with Mr. Ball's, did not uphold his own thoughts. In both cases the groups were too small to draw any but mild deductions. The fact that all bobbins, exclusive of Murphy's button, had a tendency to produce cicatricial contraction of the gut he did not believe to be quite true. There was a type of bobbin with a deep groove between two projections, and, obviously, if the bobbin were two inches at the periphery and one and a half inches at the groove, the gut would have to be puckered and thrown into folds which became adherent, and the material for the subsequent cicatricial contraction was provided. Mr. Ball's bobbin he considered most ingenious, and an apparatus which every surgeon ought to have by his side. He congratulated Mr. Ball on dividing Poupart's ligament. He had lately been at an operation where it had been proposed to use a bobbin, but this was not done. If Poupart's ligament had been divided, the bobbin might have been used and a considerable amount of time saved. At the same time, he did not quite understand how Mr. Ball prevented a weakness having taken place at the abdominal ring after division of Poupart's ligament. Under certain circumstances, where there was a fat mesentery, he thought it impossible to produce equable uniform pressure by means of a Murphy's button.

Professor Bennett asked if, in a case of Dr. Ball's, a ventral hernia had not occurred after the division of Poupart's ligament.

Mr. Heuston (in reply) said that his operations by simple suture had been carried out in much less time than Mr. Lentaigne thought.

He disagreed entirely from Mr. M'Ardle in the use of Murphy's button, and he did not see what right any surgeon had to deliberately set up gangrene, close it up, and leave it to extend a certain distance to be limited by a part of the gut cut by the bobbin. He did not say that he was opposed to bobbins, but none of them so far were, in his opinion, proper appliances; but the best of them, he considered, was Mr. Ball's. Mr. Myles' criticisms about his (Mr. Heuston's) statistics were quite fair, but they were the only kind obtainable by him.

Dr. Ball (in reply) said that he had answered Professor Bennett's question in his paper. A hernia had occurred after division of Poupart's ligament, but the hernia had not occurred at the femoral ring, and it was not in consequence of the division of Poupart's ligament that the hernia took place. It was at the site of the drain tube. The closure of the femoral ring was easily brought about by the division of Poupart's ligament. With regard to Mr. M'Ardle's remarks about a fistula which had occurred in one case, this fistula had occurred in the case of the rectum, and he (Mr. Ball) said that he had not yet come across any appliance which did not occasionally produce fistula. He had seen a case in which a large fistula had been made by Murphy's button. In other parts of the intestinal tract there were cases to show that Murphy's button was frequently a real danger which might be avoided by other methods. He had not yet seen strictures caused by the use of a ring.

CASE OF PYLOROPLASTY FOR NON-MALIGNANT STRICTURE OF PYLORUS. RECOVERY.

By JOHN LENTAIGNE, F.R.C.S.;
Surgeon to the Mater Misericordiæ Hospital, Dublin.

[Read in the Section of Surgery, May 14, 1897.]

IN February last I was asked by my colleague, Dr. M. A. Boyd, to see, with a view to operation, a labouring man, aged twenty-nine, whom Dr. Boyd had diagnosed to be suffering from dilatation of the stomach, probably a result of stricture of pylorus.

History.—The history of the case was that for the past nine years patient had been suffering from attacks of illness accompanied by vomiting and slight pain in the region of the stomach. The attacks, which lasted for varying periods from one to two or three weeks at first, recurred at intervals of three or four months, and of late their duration had greatly increased. The present attack had begun in May, 1896, since which time he had been continuously suffering more or less up to the present time.

During the months of June and July last the pains and vomiting had considerably abated, but in the middle of August they became very severe, and had continued without one week's intermission up to date of admission to hospital, on January 16th, 1897. Since October last he had been extremely weak. His dietary had usually consisted of—breakfast, oatmeal porridge; dinner, potatoes, cabbage, and bacon; supper, oatmeal porridge.

On admission he was found to be pale and anæmic, greatly emaciated, and extremely feeble. Examination showed decided prominence of the upper part of the

abdomen on the left side, with relative depression of the epigastrium; there was great extension of the area of stomach resonance. The splash sound was elicited on percussion. He vomited usually about twice in the day a large quantity of some frothy matter, and the vomiting was usually followed by some relief of pain in the stomach, which was always greatest when the amount vomited was large—two quarts or more. Free HCl. was found in the vomited matters, and considerable quantities of indican were reported by the pathologist to be in the urine.

The patient's condition was such as to render any operative procedure both dangerous and unpromising in the extreme, but as it was evident that he could not last very long without relief, and as his life seemed utterly miserable, I had no hesitation in recommending him to have the operation of pyloroplasty performed, as it seemed to me to give him the only chance, although a small one, of cure. The patient himself eagerly accepted the proposition, and indeed he repeatedly urged me to accelerate my preparations.

On February 26th last I performed the operation, assisted by my colleague, Mr. P. J. Hayes. From what I had read on the subject, and from my experiments on the dead subject, I had been under the impression that the operation would be short and easy. I found it, however, to be very much the reverse. I first made an incision in the linea alba between the sternum and the umbilicus, about 3 inches long, which subsequently I had to extend considerably. The stomach was enormously dilated, and the pylorus was found to be tied down towards the spine by numerous adhesions. It was quite impossible to bring it out of the abdomen, as I had easily done on the dead subject, or even near to the incision in the abdominal wall, and I was

compelled to work at the bottom of a deep hole at a very great disadvantage.

I made an incision in the anterior wall of the stomach, parallel to the long axis of the pylorus, and introduced my little finger into the stomach. After some delay the pylorus was found; it was tightly closed, and it was impossible to introduce the tip of the little finger. I then prolonged the incision through the pylorus by cutting with scissors, and then on into the duodenum for about 1½ inches, the entire incision being about 3½ or 4 inches long. The pylorus was found to be greatly thickened, and there was what seemed to be an old cicatrised ulcer, with thickened base, on the posterior wall of the stomach close to the pylorus. The cut surfaces bled freely. After arresting the hæmorrhage with forcipressure forceps, the lips of the wound were caught with a tenacula at the middle of the incision, corresponding to the site of the contracted pylorus, and the edges were drawn as widely apart as possible. Two strong silk sutures were passed outside the tenacula, so as to enable the parts to be kept steady, and the edges of the wound—which was now changed from being a longitudinal one to one transverse to the long axis of the pylorus—were sutured together by a double row of sutures of fine silk, the first including only mucous and muscular coats, the second a row of Lembert sutures only, including serous and muscular coats. These last were reinforced by a few more Lembert sutures where the junction seemed to be weak or at all imperfect.

The process of suturing was extremely difficult and tedious, as the patient was persistently hiccoughing almost all the time, and large quantities of blackish fluid were constantly regurgitating both from the stomach and the duodenum, flooding over the entire area and requiring incessant sponging. The fluid from the duodenum acted

on the epithelium of my fingers so as to make them quite slippery, and greatly added to the difficulty of holding the needles.

The operation lasted nearly two hours, and the patient was so much collapsed that I greatly feared he could not survive the shock, but he rallied satisfactorily, and his subsequent convalescence was quite uneventful. For the first week he was fed by enemata.

I regret to say that he was not weighed before the operation, nor until more than four weeks after, when he had evidently very considerably increased in weight and strength, but even since then he has increased a stone in weight, and he is now apparently in perfect health.

This operation, which was independently conceived by two surgeons—Heincke, who operated in 1886, and Mikulicz early in 1887—is fully described in the fifth edition of Mr. Greig Smith's work on abdominal surgery, where the statement is made that up to Feb., 1893, 53 operations had been reported with 6 deaths.

I have not had time to investigate the recent literature of the subject, but I have obtained particulars of ten cases operated on in England. The first operation by Mr. F. Page, was performed on March 2nd, 1892, and I understand the patient is now in good health. The second by Mr. Pearse Gould, who published a valuable paper on the subject, was also cured. The third by Mr. R. S. Mills, of Windsor, in August, 1893, is also quite well at present. The fourth case by Mr. Rutherford Morrison, in Oct., 1894, and since then three other cases by the same surgeon, of whom two apparently were cured, and the other two recovered from the operation and were greatly relieved, but subsequently suffered from a recurrence of pain and other symptoms of ulceration in the stomach. Of the eleven cases, including my own case, nine recovered and two died.

Of the nine recoveries two were subsequently troubled by recurrence of ulceration. I have no doubt that there have been many others which have not been recorded, but I think that the results of these eleven cases amply justify the operation.

Comparison of Loreta's Operation with Pyloroplasty.—In Feb., 1895, an interesting series of cases, originally published by Mintz, have been quoted by Dr. Hammen, of New York. He collected 22 cases of Loreta's operation, with 13 recoveries—*i.e.*, 59 per cent.; whereas 29 cases of pyloroplasty are mentioned, with 22 recoveries—*i.e.*, 82·7 per cent.

In any case the procedure in pyloroplasty, which leaves a wide opening from the stomach to the duodenum, with the old contracted pylorus forming the posterior wall of the opening, seems in every way preferable to the forcible dilatation of Loreta, which, besides the dangers of unknown injury to the tissues, would always leave a probability of recurrence.

APPARATUS FOR AIR DISTENSION OF BLADDER IN SUPRAPUBIC CYSTOTOMY.

Mr. John Lentaigne exhibited an apparatus for distending the bladder with air in the operation of suprapubic cystotomy. The apparatus consisted of an India-rubber air-pump with reservoir of the same material, similar to that used with the ordinary hand spray; this was attached by means of a rubber tube to a silver catheter, which was introduced into the bladder. In using the apparatus the reservoir was first distended with air, which was then allowed to gradually distend the bladder, and the operation was then performed. If it became necessary to force the bladder forward in the wound, pressure was made on the

reservoir outside. The reservoir indicated the amount of tension in the bladder, which could thus easily and safely be increased when required. Mr. Lentaigne had used this apparatus in a case quite recently, and had found it of great service in many ways. He had closed the bladder wound with catgut sutures, and the entire wound had healed by first intention.

The President said he was sure that the Academy would feel greatly indebted to Mr. Lentaigne for his most interesting case. It had the great merit of having been successful, and the operation seemed to him to be an improvement upon Loreta's method. The comparative success of the proceeding was a very strong recommendation that they should do that operation in suitable cases, rather than simply dilating the strictured pylorus, and the method was much safer. He referred to a suggestion made by Mr. Robson to introduce a button with the object of lessening the time in suturing.

Professor Bennett congratulated Mr. Lentaigne on the success of his proceeding. His own experience in the matter was very limited, but he took it, he said, that the operation was one that was proposed for stricture of pylorus which was not malignant.

Sir William Stokes said that it was very encouraging to hear the statistics in connection with Mr. Lentaigne's operation.

Mr. Nixon said that he had seen the patient shortly after the operation, and in looking at him now, he had no hesitation in saying that the man was brought from death to life. He thought that Mr. Lentaigne was to be heartily congratulated on his success, and also Dr. Boyd upon his diagnosis.

Mr. Myles said that the real question underlying the paper was whether the operation of pyloroplasty was the best method of treating stricture of the pylorus. If the operation of pyloroplasty took two hours in the hands of a skilful operator, he thought that it compared very unfavourably with the operation of gastro-duodenostomy which could be done in about twenty-five minutes. The results of the latter operation were also very favourable. Another objection was that until a microscopic section had been made, one could not be sure that the stricture was fibrous.

Mr. E. H. TAYLOR said that he did not agree with Mr. Myles in placing the operation of gastro-duodenostomy in cases of this kind before the operation of pyloroplasty. If the case was one of malignant stricture, he thought the ideal operation was gastro-duodenostomy. Recent French statistics showed that the operation was very successful, and it was an operation which, in his opinion, ought to be advocated.

MR. LENTAIGNE, in reply, thanked those present for the way in which they had received his paper. With regard to Professor Bennett and Mr. Taylor's remarks, he said that the operation was only suitable for non-malignant stricture of the pylorus. The success of the operation in such a large number of the cases reported, seemed to him to justify a place for it in surgery. With regard to Mr. Myles's remarks, he (Mr. Lentaigne) said that his operation had been a very exceptional one as regards the time taken in performing it, but this was on account of the peculiar condition of parts. Many other reported cases of pyloroplasty had been quite easy, and the time taken very short. He considered that a surgeon could almost always be able to decide with accuracy whether a patient was suffering from simple or malignant stricture when he considered the conditions of the parts seen in the operation along with the clinical history.

FRACTURE OF THE METACARPAL BONE OF THE THUMB.

By E. H. BENNETT, M.D.;
Professor of Surgery in the University of Dublin.

[Read in the Section of Surgery, May 14, 1897.]

In November, 1881, I submitted to the Pathological Society of Dublin five specimens of united fracture of the base of the metacarpal bone of the thumb, all of the same pattern—oblique fractures passing through the articular surface forwards to the palmar side of the bone. I showed, by comparing these with the entire series of united fractures of the metacarpal bones, that so far as the collection in the Museum of the School of Physic would go to determine the relative frequency of fractures of the several metacarpal bones, this injury of the first bone was the most common. I established also the fact that this particular fracture occurs most commonly on the right side; all the five specimens were right-hand bones.

In 1885 the number of our specimens was six, the additional one being again right-handed. I had during the interval between 1880 and 1885 seen several instances in the living, all right-handed. In 1885 I saw for the first time in the living a left hand deformed by this injury. Now the number of our specimens is ten, and one of these belongs to the left side.

I have never dissected the recent injury, and many a year may go before the opportunity for such investigation can be made, because the fracture is not likely to be associated with injury to vital organs. But we need not wait for this opportunity to verify our reading of the details of the fracture, deduced from the old united injuries associated with

clinical observations. The X-rays demonstrate as clearly as dissection of a recent fracture could the details of the lesion. I have to thank my colleague, Dr. W. S. Haughton, for the photographs which I now exhibit of two recent fractures, one (*a*) three days,[a] and the second (*b*) three weeks old.[b] From these pictures one can verify the correctness of the description I have given of the injury.

I now present the first left-handed pathological specimen which I have obtained (*c*), and place beside it the bone (*d*) of the opposite hand for comparison, so that one may appreciate the change in the form of the left bone as seen in section of the old united fracture. This knowledge is necessary to enable one not very familiar with the lines of such a section to recognise the existence of the united fracture, as seen in the photographs taken by X-rays. This familiarity with the shape of the bone altered by fracture enables me to put before the meeting the latest fact bearing on this subject which I have observed—namely, that the injury may occur in both hands simultaneously, just as Colles' fracture and epiphysiary separations of the carpal extremities of the bones of the forearms may take place simultaneously. These casts which I exhibit show the deformity of the hands in this simultaneous fracture. They are taken from a man who was admitted to Sir Patrick Dun's Hospital this winter in consequence of fracture of both bones of one of his legs. The deformity of each thumb is characteristic of the fracture of base of the metacarpal bone of the thumb when the union has taken place without being modified by treatment.

[a] (*a*) First seen and skiagraphed three days after injury. *History.*—The patient, a labourer, was wheeling a barrow of whiting along a plank on the quays, whilst unloading a ship. The barrow and man tipped off the plank, and his thumb struck the plank or the ground.

[b] (*b*) Case three weeks after injury. *History.*—On a Saturday night he had a row in a public-house, and "thinks he must have struck a man on the face." Since then he could not use the thumb. Both these cases were in the right hand.

a *b*

RECENT FRACTURES OF THE BASE OF THE FIRST METACARPAL BONE

c *d*

UNITED FRACTURE OF THE BASE OF THE FIRST METACARPAL BONE OF THE LEFT HAND CONTRASTED WITH THE NORMAL BONE OF THE RIGHT HAND

e *e*

UNITED FRACTURES OF THE FIRST METACARPAL BONES IN BOTH HANDS
WHICH OCCURRED SIMULTANEOUSLY

About seventeen years ago this man, a carpenter by trade, fell some ten or twelve feet in consequence of a ladder on which he was working breaking under him. He fell on to his hands, and had the bones broken in both hands. He says he was thrown out of work by the injuries for over three months.

Now the X-rays complete the diagnosis here, for if one compares the shadows of the bones (*e*) with those of the normal bone the shortening of the first metacarpal bone on the palmar aspect is evident in each picture.

The President said that the communication was a very important one. The photographs exhibited by Mr. Haughton showed the condition of the fracture in the living, which, as pathological conditions after death, it had been so difficult to find.

Mr. Swan said that the paper was of particular interest to him, inasmuch as he himself has sustained a fracture similar to that described by Mr. Bennett. He had received the injury by striking an object, and he subsequently found that he was unable to grasp a glass, because the metacarpal bone of his right thumb slid away from what he conceived to be the carpal or near extremity of the fracture, or, in other words, that the shaft of the bone was dislocated from the small portion which remained in position with the trapezium. There was a great deal of swelling in the hand, and the pain was intolerable. Many surgeons had considered the injury to be a dislocation; but it was not until reading Professor Bennett's communication in the *Dublin Quarterly Journal* of 1881 that he understood the nature of the injury.

Mr. Lentaigne spoke.

Sir William Stokes said that they owed the description of the injury to Professor Bennett, and it was a matter of great satisfaction to him to know that he (Professor Bennett) had received very full recognition by eminent writers, not only at home, but in France and Germany, for having given the best description of the injury. He had merely to express the wish that the injury might, in the future, be associated with the name of Professor Bennett.

Remarks were also made by Dr. Knott.

Dr. E. H. Bennett replied.

SECTION OF OBSTETRICS.

A CASE OF RIGID OS. DISCISSION BY DÜHRSSEN'S METHOD.

By E. WINIFRED DICKSON, M.B., F.R.C.S.;
Gynæcologist, Richmond Hospital.

[Read in the Section of Obstetrics, November 27, 1896.]

The term "rigid os" may fairly be applied to the following case, for the pains during the whole labour were strong and frequent, so as to drive the head through the brim of the pelvis till it almost rested on the perinæum, and yet at the end of 96 hours the os only admitted three fingers, and the edges were hard and unyielding. The details are as follows:—Early on the 20th August, 1896, a local practitioner sent to the Coombe Lying-in Hospital for help, as he had a patient who had been in labour for 56 hours, and she was making no progress. I found a healthy primipara, aged twenty-four, having strong pains and straining violently. Temperature was 98·4°, pulse 90; child was in first vertex position; head fixed; fœtal heart good. There was plenty of liquor amnii, though membranes were said to have ruptured. The lower zone of the uterus was thinned out and tightly stretched over the head; cervical canal still unopened, barely admitting one finger. Morphia was administered hypodermically—at first ¼ grain, later on ½ grain, and 12 hours later the cervical canal was obliterated, and the external os admitted two fingers. The head was still lower in the pelvis, and the liquor amnii had drained away. Chloral was then given, 15 grains every 15 minutes till 60 grains had

been given, and later on a hot bath, hot douches and an enema. Twelve hours afterwards there was very little progress, and I advised operation on account of the risk of rupture of the thinned out lower zone of the uterus. With a view to this she was removed to the Coombe Hospital, when Dr. Kidd examined her. He advised trial of manual dilatation, and this was accordingly carried out. Another hot bath was also given, and repeated hot douches. Five hours later there was no progress; os only admitted three fingers; head and encircling cervix almost rested on the perinæum. The patient was then at the end of the fourth day in labour, her temperature rose to 99·2° F., and the fœtal heart became very rapid. Operation was decided on. The patient was anæsthetised with chloroform, placed in the dorsal position, and disinfected. A duckbill speculum was inserted, and under the guidance partly of the eye and partly of the finger four incisions were made with blunt-pointed scissors, in crucial fashion, each about 1½ to 2 inches long, dividing the cervix up to the vaginal junction. The tissues cut with a harsh grating sound. There was no bleeding. Forceps were then applied, and a female child easily delivered, but in a condition of white asphyxia. It was soon resuscitated and weighed 6¾ lbs. Even after delivery there was scarcely any bleeding from the cut cervix. The uterus contracted well. After delivery of the placenta the incisions in the cervix were united with silver wire, nine sutures in all being inserted. The right lateral cut had torn slightly, the others had not torn at all beyond the original incisions. The perinæum required one stitch. The uterus and vagina were then douched with creolin solution, and an antiseptic pad applied to the vulva. Frequent vaginal douches were used during the puerperium, and the patient made a perfectly aseptic recovery. The perineal stitch was removed on the fifth day and the cervical stitches on the tenth day, and union was perfect in all.

Dr. Kidd said all the ordinary routine treatment short of surgical interference had been, in the first instance, exhausted, and then he was glad to allow Dr. Dickson to carry out the operation in question. From its results he should have great confidence in resorting to the same procedure in similar cases in future. Two or three years ago he read a paper before the Section giving a case of prolapsus of the cervix during labour, in which, owing to the rigidity of the cervix, it was carried down before the advancing head; and had he adopted the method now recommended of enlarging the outlet of the cervical zone, the case would not have ended in the tedious labour that occurred. He believed that when due precautions were taken to guard against any possibility of septic absorption the operation in question was comparatively free from risk.

Dr. Wilson said he performed this operation about a year ago in a case of rigid os. The special object in the case was to effect a rapid delivery. The os was very small, and the cervix was slit up with four incisions and delivery effected, but the child was dead, and had been, before the operation. The cervix was stitched with gut, and the woman was still alive. The ease and simplicity of the operation in question were in its favour, but he thought it should be confined to urgent cases, or cases of cancerous affection. To suture the cervix was the correct mode of proceeding, if only for aseptic reasons.

Dr. Jellett held that in cases where there were the proper indications for this operation it should be resorted to without previous manual dilatation, which was attended with risk.

Dr. Knott asked Dr. Dickson did she think mental causes had anything to do with the rigidity of the os in the case she had detailed.

Dr. Doyle thought the term "discission" was one that needed explanation.

Dr. Horne said that from time to time he had come across cases of so-called rigid os, and he did not know of any more troublesome cases. They generally occurred in primiparæ, which was hard to explain, unless it arose from some cicatricial tissue infiltrating the cervix. But he had never seen a case of rigid os that did not yield to time, patience, sedatives, and hot baths. In the Rotunda Hospital the late Dr. G. Johnston advocated an early application of the forceps before the os was fully dilated, the process being to put the patient under an anæsthetic, apply the forceps,

and leave them in without making traction. They then acted as a dilator of the best form for a condition of rigidity of the os; and when the os began to yield, a gentle traction of the instrument invariably made it slip over the child's head without inflicting a wound on the cervix. He could understand, however, the applicability of Dührssen's method to cases where the necessity for immediate delivery was urgent, or to cases of cancer with infiltration of the tissue, or cases where there was cicatricial tissue of the cervix arising from previous wounds.

Dr. Dickson, in reply, said she had no facts as to the mental history of her patient. Barnes's bags had been mentioned by one speaker, but she had never seen them used.

THREE CASES OF ECTOPIC GESTATION, WITH EXHIBITION OF THE SPECIMENS IN TWO OF THE CASES.

By FREDERIC W. KIDD, M.D.;
Master, Coombe Lying-in Hospital.

[Read in the Section of Obstetrics, November 27, 1896.]

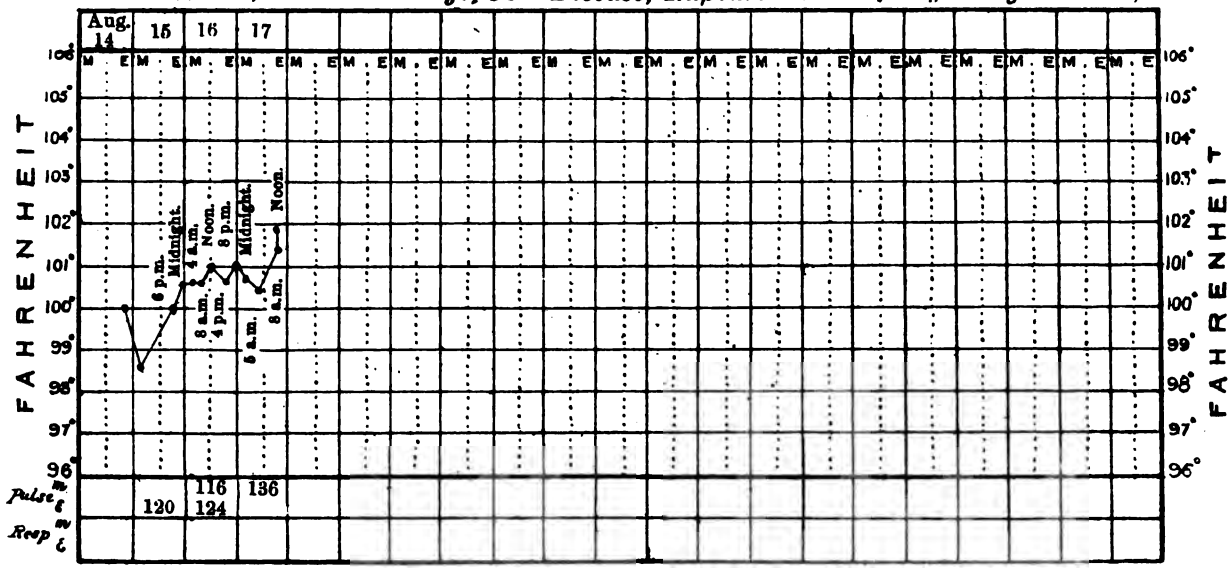
THE subject matter of my paper needs no apology from me for bringing it forward; it is one which has an interest for every medical practitioner who may chance to be called on to attend a pregnant woman, quite as much as for the obstetric specialist and the operating gynæcologist. My personal experience of ectopic gestation is limited to three cases, the notes of which I shall now place before you, afterwards making a few remarks about these cases, and drawing attention to some special points and to some valuable lessons I have learned.

CASE I.—V. S., married, aged thirty-five; admitted 14th August, 1895; never had any living children; had two abortions; last abortion eleven years ago, since which time menses have been regular, until about six or seven weeks ago.

Physical Signs.—Uterus both dextro- and ante- verted and soft; os patulous; tumour to the left side. Sound was passed normal length, with concavity anterior and somewhat to the right side.

Previous History was as follows:—Patient had been first seen by an outside doctor on 9th inst.; she was then in a collapsed and almost dying condition. On the 6th inst., as she was dressing to go out, she was seized by a violent pain in the left iliac region; she felt faint, but did not lose consciousness. She went to bed, and, though the pain diminished, she was troubled with palpitation and ringing noises in her ears. She noticed a slight hæmorrhagic discharge from the vagina on this day, having at the time gone two weeks and 5 days past her regular time—*i.e.*, it was almost seven weeks from her last menstruation.

1895. *Name, Mrs. V. S. Age, 35. Disease, Ruptured Tubal Pregnancy. Result, Death*



On the following two days (7th and 8th) she felt a good deal better, but on the evening of the 8th, and all that night, she had very severe pain. A doctor was sent for early in the morning of the 9th, and found her greatly collapsed, as before mentioned; she rallied under suitable restoratives, and the case was carefully watched. The question of intestinal obstruction was raised, as there was so much shock and the bowels had not moved for three days, but later on they acted, and were then well cleared out with castor oil, and again with calomel. For the next few days she seems to have been better, and then to have had another very severe attack of pain, followed by collapse. The abdomen was at this time extremely tender to the touch. The patient bore hypodermics of morphia badly, and was put on digitalis and opium. During this time there was a slight hæmorrhagic discharge from the vagina, but it was intermittent. The doctor in attendance examined the patient per vaginam, and found the external os patulous, and a swelling at the left side; but the abdomen was so tender that a bimanual examination was impossible, and, moreover, she was suffering from inflamed external piles. On the morning of the 14th the patient was seen by Dr. Winifred Dickson, and later on by the late Dr. George Kidd, and a probably ruptured extra-uterine fœtation was diagnosticated. On this morning the patient had rallied somewhat, and there was less abdominal tenderness, but examination was still painful. Two pieces of tissue (about $1\frac{1}{2}$ in. $\times$ $\frac{1}{2}$ in.) had come away from the vagina on that morning, and these looked like, and probably were, decidual membrane from the uterus. Their expulsion was accompanied by pain, which the patient said was like the pain experienced in her former miscarriages, but there was very slight hæmorrhage. A tumour was felt at the left side of the uterus, and a soft indefinable mass in Douglas' pouch.

Dr. Kidd thought that with care the patient might be moved, and she was accordingly brought to the Coombe Hospital in an ambulance. The first doctor in attendance reported that the patient's temperature had been normal throughout the illness, but that her pulse had been very variable, from 90 to 140. It was about 110 on the 14th. The patient looked very ill; her lips and mucous membranes were blanched, and she was said usually to have very red lips. She complained of violent headache, and said she had had cold perspirations. She has always been a delicate subject—small, pale, sallow, and of Jewish extraction. In early childhood her left elbow was excised, and there is still a small discharging

sinus. Fourteen years ago her right foot was amputated by Mr. Treves for bone disease, apparently tubercular, like the elbow. She has been married twelve years, and the two miscarriages occurred during the first year. One was six weeks after marriage, and the other six months after marriage; the latter time she went about two and half months. Since then she was always perfectly regular until this occasion. She bore the journey to the Coombe Hospital very well, and after two hours rest she was put under chloroform, and examined by the Master, who confirmed the diagnosis of extra-uterine fœtation. A tumour about the size of a hen's egg was found in the position of the left tube; the uterus lay anteriorly, and slightly to the right; the sound passed the normal length; external os patulous. As the bowels had been confined for two days it was decided not to operate until the following day, so as to have them well moved. The patient was given 6 grains of calomel, followed in the morning by a seidlitz powder and an enema, with satisfactory results.

On the 15th, at 12 30 p.m., the patient was put under chloroform, and the Master, assisted by Dr. Geo. H. Kidd, performed laparotomy. When the abdomen was opened a large quantity of fluid blood, more than a quart, escaped, and quantities of black clots were sponged away. The left tube and ovary were removed, and clots sponged out of the substance of the broad ligament, the folds of which had been separated by the hæmorrhage. But little blood was lost, apparently, during the operation; what flowed away was nearly all dark, and not recent. The abdomen was washed out with hot boric acid lotion, and a gauze drain was introduced to pack the raw surface left in the broad ligament. The operation lasted about two hours, and was performed mostly with the patient in the Trendelenburg position. The patient bore the administration of chloroform very well, and rallied after the operation was over. The swollen part of the tube, about the size of an egg, was split open, and a perfect embryo about $\frac{3}{4}$ inch long was found in the centre.

On the evening of the operation, as the patient had great pain, she was given a dose of the "three fifteens." This soothed her only partially, so that another half-dose had to be given, after which she slept for four hours. The external dressings were changed before she went to sleep, as there had been some discharge soaking through them.

On the morning of the 16th she seemed bright and well, but her

tongue was very dry; pulse, 110. About 2 p.m. she suddenly seemed to get a change for the worse; a blueness showed round the lips. The drain had to be changed, and this was so painful that she was given chloroform, which she took well. Some dark-coloured bloody fluid welled up from the abdomen. This was sponged away, and a thin strip of iodoform gauze introduced. She complained of great pain during the afternoon, and got 15m of liq. opii. sed., but without much relief. She was also given gr. i. calomel every hour for six hours, followed by 3i. of sulphate of magnesia every hour, but the bowels did not act. Some flatus, however, passed during the night, and that gave her some relief. The "three fifteens" were again given during the night, and after that she got some sleep. All this time she was being fed with nutrient enemata—egg and beef tea, with some brandy occasionally, and only got teaspoonfuls of hot water by the mouth.

On the morning of the 17th the patient was evidently dying—her face was sunken, pallid, and pinched, and her hands were cold. She complained of great tenderness and fulness in the abdomen, which was found to be moderately distended. There was not much discharge on the dressings, and they were not fœtid. A large enema with turpentine was given, but no fæces came away; the long rectal tube was then introduced. A large hypodermic injection, containing half a grain of morphia with atropia, was given to try and ease the pain. The patient died at 2 30 p.m. There was not, I regret, any autopsy feasible.

There are several points of interest in this case which I shall briefly advert to. Firstly, as to the time which had elapsed between the first symptoms of hæmorrhage and the abdominal incision—nine days. This was a long period, and my reading of the case is that there really had been two hæmorrhages—one, the first or primary, happening on the 6th when the tube ruptured into the folds of the broad ligament; she was then better until the night of the 8th, when she again almost collapsed. This was followed by a period of comparative freedom of pain, only to be succeeded by a worse attack of pain accompanied by collapse. I think one or both of these later attacks of collapse were caused by rupture of the hæmatoma between the layers of the broad ligament into the

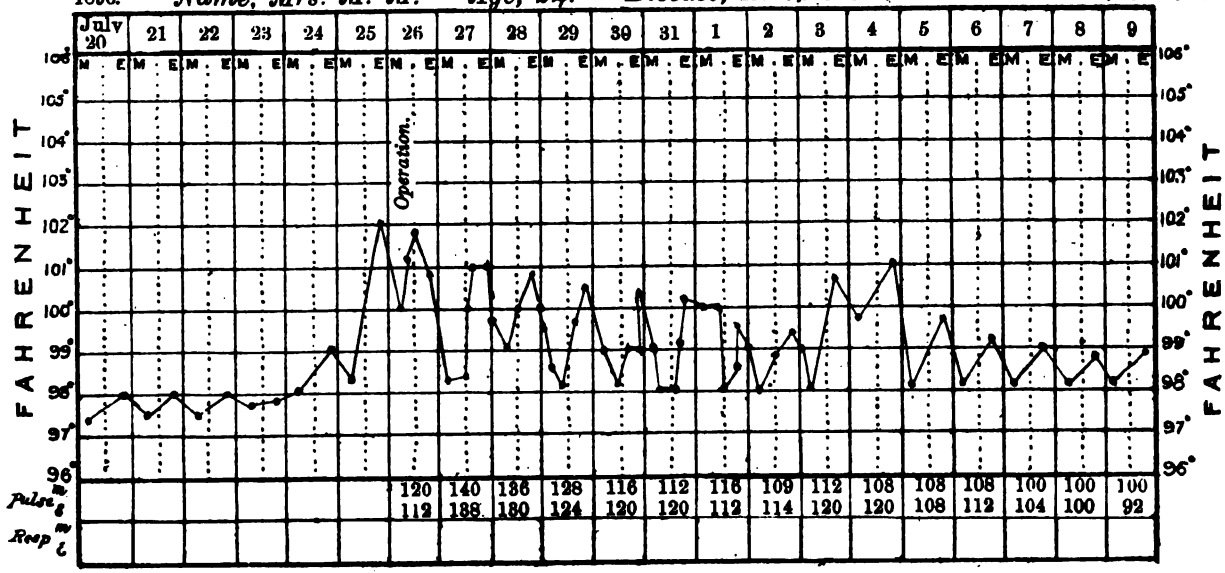
general cavity of the peritoneum. At the time of the operation the injured broad ligament was found torn and very much lacerated, full of coagulated blood. Such a condition must necessarily very much diminish the chances of a successful operation, and carries out only too truly the axiom of Lusk, saying that "the resources of surgery are rarely successful when practised on the dying."

Secondly, were I to operate again on this case I would alter the *technique* of my operation very considerably—I would be more careful than I was to remove *all* of the blood-clots and blood from the pelvis and peritoneum. This I might have done more thoroughly, but was induced to hasten on the completion of the operation once I had the bleeding points tied. I would have introduced the normal saline solution in washing out the peritoneal cavity instead of boric acid solution, and I should have been tempted to drain through the vagina. The peritoneum was so injured by the secondary rupture that it was hopeless to draw it together again. The gauze drain really seemed to act more as a plug than a drain. I regret that the specimen in this case has been lost.

The following case (II.) differs in many of the salient points from the case that I have detailed. Firstly, the primary rupture took place into the folds of the broad ligament, and there never was any further rupture, so that the patient carried the product of conception in this gestation sac for a period of about twelve months. Secondly, she was seen at the hospital about the period when the primary rupture must have occurred, and her condition was not recognised; and thirdly, she made a remarkably good recovery. The details of her first visit to hospital are as follows:—

Case II.—M. M., aged twenty-four, married two years, was admitted on 30th Sept., 1895; had one seven months' child, born 18th Oct., 1894, which lived only six hours. Mother was removed

1896. *Name, Mrs. M. M.* *Age, 24.* *Disease, Ectopic Gestation.* *Result, Cured.*



to Cork-street Hospital from her own home next day with small-pox. In June, 1895, she aborted when three months pregnant, but could not assign any cause. Menses had been in abeyance for six weeks—from Aug. 2nd until Sept. 11th—but red discharge had returned, and already lasted three weeks at the time of her admission into hospital, at first rather profuse, but lighter at time of admission, accompanied by severe pain in lower part of abdomen. At this time there was no rise of temperature higher than 99·4°. The lower part of the abdomen was very tender, so as to make any *satisfactory* examination impossible; there was troublesome constipation. The case was diagnosticated as one of pregnancy, with threatened abortion and some slight localised peritonitis. I told her from the size I found what I believed the uterine tumour to be, that she must have made some error in calculation, and that she was longer pregnant than she thought she was. Rest in bed, a sleeping draught for first two or three nights, and careful attention in relieving the constipation, banished all her symptoms, and she was discharged *well* on the 19th. Unfortunately no further examination was made after the pain had been relieved, principally because any further examination might interfere with the pregnancy, having aborted so recently without any cause being assigned.

We lost all sight of her until she returned to the hospital on the 20th of the following July—a year all but twelve days from the time when she had the last regular menstruation—when she gave the following history:—Had had at times an irregular red discharge, sometimes preceded for a day by slight pain. Had no red discharge from October until March, when it lasted for a week; again in April, twice in May, and not since. Complained of obstinate constipation and frequency of micturition. On examination—vagina short; cervix small; os externum sufficiently patulous to admit the tip of the finger. Has a tumour extremely tense, having an indistinct elastic feeling, smooth on the surface, but seeming to have more resistance in some parts than in others; slightly more developed on the left side than on the right; cannot be freely lifted out of pelvis, but capable of slight motion; contents evidently very tense; extending nearly a hand's breadth above the umbilicus; dull on percussion. Measurements—from ensiform cartilage to symphysis pubis, 16¾ in.; ensiform cartilage to umbilicus, 7¼; umbilicus to left anterior superior spine of ilium, 10 in.; right side, 9 in. Circumference at umbilicus, 34 in.; one inch above, 33½; one inch below, 34¾.

Various diagnoses were made, nor was the question of extra-uterine fœtation entirely forgotten. The uterus was discovered lying behind and to the right, and the sound passed into it a distance of 3½ in.

On the evening of the 24th patient complained of shivering and headache; temperature went up to 99°. Next evening it rose to 102°; she complained of pain in back and round hips. Abdomen seemed, if possible, more tense, but at level of umbilicus and towards left side you could now get a tympanitic note on percussion which did not exist before. This aroused the suspicion that some putrefactive changes were taking place in the tumour. That night the patient vomited green matter, and the temperature still remaining high we determined to operate at once, even though it was Sunday. The patient having been prepared in the usual manner, an abdominal incision was made about 1½ inches below the umbilicus towards the symphysis pubis. When the abdominal wall was incised, on account of the tenseness of the tumour, it was very hard even then to make out the relations of the parts. When the gestation sac was reached (it was not recognised as such at first) it seemed to be about one-third of an inch thick at least, and cut like uterine tissue. When incised there was an escape of the most fœtid gas imaginable, then the body of the child coming into view established the diagnosis. The child, which I here exhibit, was removed. Before I thoroughly grasped the relations of this gestation sac in my mind, I had separated it above from the parietal peritoneum until I had made an opening above which communicated with the general peritoneal cavity. This I had to shut off by careful suturing afterwards, but I did it in fear and trembling lest some of the really putrid contents of the sac might possibly have got in.

Before the removal of the child I had cut the cord. On examining to find out the condition of the placenta I found it actually rotten, and could easily remove the major portion of it as a putrid, broken-down mass. The peritoneal cavity having been shut off by careful suturing, the cavity of the gestation sac was stuffed with iodoform gauze to keep its external walls close to the external abdominal incision. In this way adhesion must have taken place at once. There was not a single suture put in the incision. Naturally there was a very putrid discharge for some considerable time. I here submit a chart of her convalescence. With regard to her recovery there is very little to note; it was

very prolonged, so much *débris* had to come away, and such a large gap had to granulate up. The original incision, which was large enough for me to deliver the child with ease, contracted until the cicatrix was only, at the most, three inches long. Several of the silk sutures, which I had inserted between the gestation sac and the parietal peritoneum, came away. The granulation tissue in the centre of the cicatrix would not completely close for a long time, although caustic, sulphate of copper solution, and other methods were adopted, until finally curetting with a fine curetté brought away a silk ligature that may have been causing sufficient irritation to keep it open; when this was done it rapidly closed. The patient was fitted with an abdominal belt and allowed to go about.

This case presents many points of interest, and is, or should be, certainly a warning to be more careful in our examinations and diagnoses. Had such a condition as extra-uterine gestation suggested itself to us when she came to the hospital on the first occasion we could hardly have failed to make the diagnosis. In extenuation of the fact that a definite diagnosis was not made in this case, it may be interesting to quote what has been written on the question of diagnosis by Tait and others:—

Tait says, when a patient is "in danger of death from conditions within the abdomen which do not seem to be clearly of a malignant nature, but a correct diagnosis of which is impossible, I open the abdomen and at once make the diagnosis certain, and a successful treatment possible."

Tait adds, "*Absolute accuracy* of diagnosis in the abdomen is *very far* from being *possible;* only the *ignorant assert that it is*, and *only fools wait for it.*"

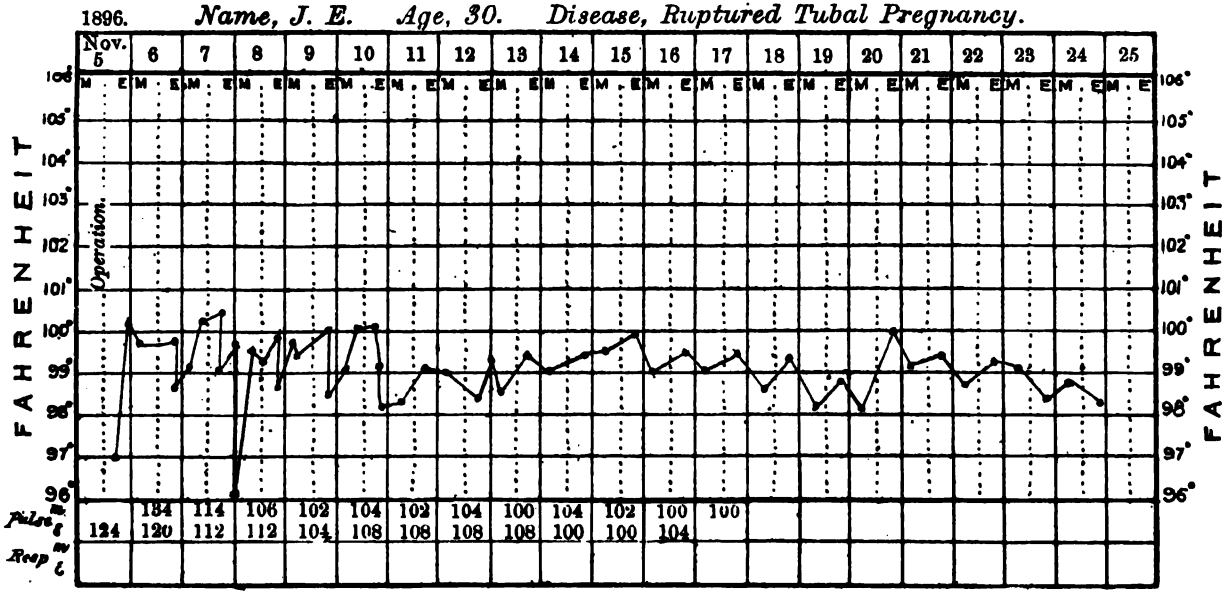
Strahan, in his "Essay on Extra-Uterine Fœtation," talking of the ease of diagnosticating between extra-uterine fœtation and a small fibroid, says—"But it is a very different story in the advanced stage, or rather when extra-uterine gestation is over, and the remains of the fœtus are consolidated in a mass close to the uterus; when all liquor amnii

has been absorbed, and nothing characteristic of a fœtus remains. This constitutes one of the most difficult cases for diagnosis which could be imagined, and a diagnosis of fibro-cystic tumour of the uterus is very generally made, often as a mere cloak for conscious ignorance."

Again, in the same strain, Parry says—"Although from the careful perusal of numerous histories of cases of this nature some degree of facility of distinguishing their presence may be acquired after a certain period of their duration, and of *deciding*, even in *occasional* instances, on the particular variety of such pregnancies, yet assuredly every practitioner who has attentively studied the subject must admit the distinction to be a task of no ordinary difficulty. There only remains the exploratory incision as a means of diagnosis."

Tait says, "That even were opportunity of examining given, we should fail fifty times for once that we could be certain."

The patient told us on her second visit that the tumour had grown gradually, that she thought herself pregnant—even imagining at the time that she felt movement of the child, which must have been long dead. She said her breasts enlarged and were full until April, since when they had become quite soft and flat. She had *no* pains similar to labour pains at any time. There was excessive frequency of micturition, accompanied by some pain; there was constipation, but no pain when the bowels acted. Here we miss the usual pains described as "spurious labour." This is an exception to the rule of many cases—that ectopic gestation is preceded usually by a prolonged period of sterility. With regard to the danger of removing the placenta, although in a case of Depaul's fatal hæmorrhage followed its removal four months after the death of the fœtus, yet I think it was perfectly justifiable in this case. I removed nothing that did not come away just as broken-down tissue in my hand.


1896. Name, J. E. Age, 30. Disease, Ruptured Tubal Pregnancy.
Nov. 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
M E
106° 105° 104° 103° 102° 101° 100° 99° 98° 97° 96°
FAHRENHEIT
Operation.
Pulse
Resp
184 114 106 102 104 102 104 100 104 102 100 100
124 120 112 112 104 108 108 108 108 100 100 104

The constitutional disturbance caused by the commencing putrefaction of the contents was quite sufficient indication for operation. This raises the interesting point as to how the putrefactive changes commenced in the above case. Was it through infection by the entrance into the sac of the Bacterium coli commune, and had the stripping up of the peritoneum as the gestation sac grew anything to say to the question of facilitating the advent of bacteria?

The third case is no less interesting than either of its predecessors. In this case we were able to make the diagnosis of "abdominal collapse" and hæmorrhage without any difficulty, and, *par voie d'exclusion*, it could not depend on anything but a ruptured tubal pregnancy.

Case III.—J. E., aged thirty years, married for the second time; first married about three and a half years ago to her first husband for ten or twelve months, when he died; never pregnant then; married to her present husband two years and four months. On January 7th, 1896, she had a full-time child, which she nursed for about six weeks; had to stop nursing as she had not enough milk for the child. On August 15th had an abortion at about two and a half months. Menstruation returned on 1st September, and lasted four days. On 28th or 29th of October she had a gush of hæmorrhage with clots; says she had pain, more or less acute, for some time in lower part of abdomen; red discharge continued until she was operated on. On evening before admission she was making preparation for bed when she was seized with a sudden internal pain, succeeded by violent retching and very free action from the bowels; she had what she describes as "three weaknesses," and sent for medical aid. The doctor on his arrival applied poultices without any very marked good results, and the pain continued up to the time of operation. The next day our Clinical Clerk, Dr. Maguire, was sent for, and, recognising the serious condition she was in, had her removed at once to the Coombe Hospital. I was telephoned for by Dr. Dickson to come prepared to open the abdomen, as she had diagnosticated ruptured tubal pregnancy. This was about 3 30 or 3 40 p.m., and the evening was dark and gloomy. Acting on a hint from Dr. Dickson, I called on Sir Thornley Stoker and borrowed an electric lamp and accumulator. The lamp

was fastened by an universal joint to a steel spring, which came from the back of the head over the forehead. Thus armed I went to the hospital, and within half an hour all preparations were made. The patient had had to get opium after she came into the hospital to try and relieve the pain. She was quite blanched when I saw her; very restless; barely able to enunciate a word; skin in a cold perspiration; pulse scarcely perceptible at the wrist.

When the patient had been put under chloroform an examination was made, both by myself and Dr. Dickson, for purposes of diagnosis. No bulging of fluid was detected in the posterior *cul-de-sac*; the whole abdomen was tumid and tense, and when the patient was turned from one side to the other there was no difference in the percussion note at the same level, depending on the position of the patient, such as one usually finds with ascitic fluid.

The ordinary precautions could not be carried out, but the pubis was shaved, and the abdomen had had a carbolised pack put on after having been well washed with carbolic soap and water.

The patient was placed on a Trendelenburg table, which was not raised up at first. A small incision having been made, the peritoneum was reached; it shone with that black back-ground typical of the free peritoneum when filled with blood. When incised a small fountain of fluid blood spurted out. A great deal of this was got rid of by pressing the flanks upwards, then the incision having been enlarged, there was a very large quantity of clotted blood removed from the pelvis, having the appearance of black currant jelly. I may here say that a rough examination was made of the clots as they were removed, with the result that this body which I now exhibit was found imbedded in one which seemed larger than most others. It is undoubtedly an impregnated ovum, and was the only body we discovered. When most of this was removed the table was placed in the raised position, and the electric light brought to bear on the contents of the pelvis.

I shall never forget the picture that presented itself under the strong light, the sides of the incision being held open by tractors that were at the same time reflectors. The intestines having been pushed up towards the diaphragm, the uterus, the adnexa, and the injured tube were plainly to be seen. It was a matter of a very few minutes to draw up the ruptured tube, to ligature and remove it—three ligatures were all that it was necessary to use. The table was then lowered again quite flat. A good deal of blood had

gravitated up to the diaphragm; hot normal saline solution was used to wash out most of this, and a considerable quantity of this was left in the peritoneal cavity. The incision was then stitched with Reverdin's needle and silk-worm gut in the usual way, and the usual dressings applied. The operation took only about five and thirty minutes. Several times the patient was almost moribund. and had to get brandy by the rectum and one or two hypodermics of ether. However, when the saline solution was poured into the peritoneum it had a most beneficial effect.

The patient's convalescence has been very good. The sutures were removed on the eighth day, and the dressings changed then for the first time. Incision well healed, except at one spot between two sutures, where one side had overridden the other. On the third night after the removal of the stitches the patient was discovered with her hand underneath the dressings, scratching the wound. Next day there was a blush over lower end of incision; this resulted in a small superficial abscess in wall of abdomen, which contained perhaps half a teaspoonful of pus. The patient is now quite convalescent.

The points worthy of note are—that in this case again the tubal pregnancy followed immediately after an abortion, contrary to the general rule; that even when the patient was under chloroform so little evidence of so much blood in the peritoneum could be obtained by palpation.

On examining the specimens before us obtained from this case, one is very forcibly struck by the smallness of the ovum, and the smallness of the rent in the tube. That a woman may bleed to death from such an apparently small injury is rendered all the more credible when we remember that the hæmorrhage irritates the peritoneum to throw out more lymph, and so retards clotting until the blood is in a very great preponderance.

A very noteworthy observation in this case is the immense advantage of working with the electric lamp, whose only inconvenience was that occasionally it touched the head of my consultant surgeon and assistant at the opposite side of the table when we both tried to look into the pelvis at once. He

declared it burnt him a little. For the very excellent notes of the first case I am indebted to my assistant, Dr. Winifred Dickson. I am also indebted to the late Dr. G. H. Kidd and Dr. Purefoy for their assistance in the first of these three cases, and to my skilled consultant, Dr. Heuston, for valuable assistance in the latter two cases.

A CASE OF RUPTURED TUBAL PREGNANCY TREATED BY ABDOMINAL SECTION.

By J. ALFRED SMITH, M.B.;
Examiner in Midwifery, Royal University of Ireland;
Professor of Midwifery, Catholic University of Ireland.

[Read in the Section of Obstetrics, January 8, 1897.]

On the 17th of August, 1896, about 4 30 p.m., I was sent for to St. Vincent's Hospital to see a patient in a state of profound collapse.

Case.—The patient, E. R., aged twenty-eight, was married eight years, and was four times pregnant as follows—viz., the first, a full term child, alive; the second, a full term child, dead-born; the third terminated as an abortion at the third month. This event happened in the month of July, 1894. Since then the patient had not been at all well, and she sought relief in the different special hospitals in this city for a displaced uterus, with only temporary benefit. In May last her uterus was curetted and a pessary put in. Her changes did not return after the curetting, and the patient considered herself pregnant. However, about half an hour before her admission to hospital, she had occasion to get up on a chair to remove a sheet from a drying line in the yard of a house in the immediate vicinity of the hospital, and, to use the patient's own words, "she fell off the chair from weakness," and was unable to rise. She felt no sudden pain, merely the intense sense of weakness. Dr. Harold, House Surgeon to St. Vincent's, saw the patient, and had her conveyed at once to hospital. When I saw the patient shortly after her admission, I found her greatly collapsed, extremities cold, face anxious-looking and blanched, and the forehead bathed in cold perspiration. She could with difficulty answer questions, and was unconscious of the presence of her husband. Temp. 96° F.; pulse 80, soft and compressible.

Abdominal Palpation.—Very sensitive over lower part of abdomen. A sense of resistance over right iliac region.

Vaginal Examination.—No hæmorrhage. The pessary, a Hodge, was removed. The uterus was retroflexed, movable, and displaced towards the left. The fundus slightly enlarged. Nothing positive was made out in either the right or the left broad ligaments.

Still her alarming condition pointed to ruptured tubal pregnancy. Dr. Tobin kindly saw the case with me, and urged the advisableness of immediate operation. Accordingly, assisted by Dr. Tobin, Dr. Harold giving the anæsthetic, I opened the abdomen. Large clots of blood were found filling the abdominal cavity. There was a momentary difficulty in making out the seat of the rupture, due to the quantity of blood-clots, and to the remarkable softness and indistinctness of the ruptured sac and distended Fallopian tube. The right broad ligament was grasped by the fingers, and a stout silk ligature applied by a Tait's large needle quite close to the uterus. This controlled the hæmorrhage. The fœtus with sac were then removed. The pelvis was cleared of some of the large blood-clots, and hot saline solution poured in. This was not aspirated or sponged away. No drainage.

The specimen consists of a fœtus, distended Fallopian tube with ovary.

The fœtus is 9 cm. long, and is attached by the umbilical cord, which is 13 cm. long, with well-nourished spinal turns, to a tuft of placental tissue, which is seen sprouting from a rent in the superior border of the middle third of the Fallopian tube. In the ovary is a beautiful example of the corpus luteum.

The chief points of interest seem to me to be—

1. The absence of acute pain at the time of rupture.

2. There was no hæmorrhage per vaginam, or any evidence of decidua being shed.

3. The uterus was in a position of retroflexion.

4. The operation was performed when the patient was in a state of profound collapse.

5. A large quantity of blood was left in the abdominal cavity; its absorption may have contributed to the remarkably rapid recovery of the patient—facts sufficiently unusual to specially justify me in bringing the case forward.

PYOMETRA WITH PREGNANCY IN THE SECOND HORN OF A UTERUS BICORNIS.

By PATRICK J. BARRY, L.R.C.P., L.R.C.S.

[Read in the Section of Obstetrics, January 8, 1897.]

The patient, aged twenty-three, unmarried, was admitted to the National Maternity Hospital on August 17th, 1896, complaining of severe pains in the right side. Menses at all times irregular and painful, but complete amenorrhœa since May last—three and a half months. Was in "Mater Hospital" in 1893 under Surgeon Hayes, complaining of pain in right side, when he removed the right ovary. After above history, following conditions noted:—Breasts are large, full, and nipples prominent, areola darkened with secretion in breasts. Abdomen enlarged and irregular in outline; on palpation two tumours readily made out—one to right side, quite hard, immovable, considered a fibroid tumour; the second to left, a pregnant uterus.

Vaginal examination—orifice quite patulous and congested; on digital examination a large tumour is found filling up the pelvis, cervix high up and to left side, tumour in pelvis continuous with cervix. Vaginal examination modifies previous diagnosis—tumour right side now looked upon as a fibroid, tumour to left side as extra-uterine or a pregnancy in a bicorned uterus. Patient kept in hospital under observation for a fortnight with the result that the fœtal heart was heard night before operation. On September 5th, 1896, patient having been put under ether, an incision was made in line of cicatrix of former opening. The tumour to right side was found firmly bound down by dense adhesions, which were with difficulty broken down, and tumour brought through abdominal opening, pedicle found and tied with twisted silk ligature, tumour cut away, pedicle pared, stitched over and dropped in. No difficulty experienced in removing left pregnant horn. Abdominal wound closed, no drainage used. The patient made a perfect recovery, the temperature only on two occasions reaching 100° F.—once on the day of operation, and again, on the eighth day, when the abdominal stitches were removed. After removal of stitches

some purulent matter escaped through one of lower stitch wounds, and continued doing so for some days. The vaginal tumour was aspirated and four ounces of pus removed, with the result that the vaginal tumour practically disappeared.

The case presents many features of interest; first of all, the difficulty in making a diagnosis—having to deal with three tumours, and an ovariotomy having been already performed. Dr. C. J. Cullingworth has described an exactly similar case, without the pregnancy in the left horn, in a paper read by him before the American Gynecological Society, in May, 1893, and fully reported in the June number of the *American Journal of Obstetrics* for that year. He has gone exhaustively into the subject, quoting many interesting cases.

I may mention that the silk ligature used in tying pedicle of right horn came away *per vaginam* four weeks after operation.

The following is Dr. McWeeney's report on specimens:—

1. Fœtus 20 cm. long, attached by umbilical cord to placenta. The placenta projects slightly from os internum and is attached to fundus and posterior part of uterus; the ovary is of large size and contains a large corpus luteum and several small cysts. The Fallopian tube is healthy.

2. The uterine wall is 3 cm. (1⅓-inch) thick. The mucous membrane in a purulent and shreddy condition. Near fundus is a soft polypoid growth, about the size of a half-a-crown.

On microscopical examination of this polypoid growth it is found to be a polymorphous cell sarcoma—a very peculiar structure and very distinct in its nature from the smooth muscle from which it springs.

The following discussion took place on Dr. Kidd's, Dr. Smith's and Dr. Barry's papers:—

The President said Dr. Smith's case very clearly exemplified the advantage of an early operation, whilst one of Dr. Kidd's cases illustrated the unfortunate result of a postponement. Of course

a diagnosis had first to be made, but the moment that was arrived at, his opinion was, and had always been, that the sooner the operation was performed the better, and that irrespective of whether the case seemed favourable or unfavourable for it. Dr. Barry's case of pregnancy in one horn of a uterus was a very interesting one. Dr. Barry stated that in his case the fœtal heart was heard very early. He (the President) never knew of the fœtal heart being heard until towards the end of the fifth month. In one of Dr. Kidd's cases the pregnancy lasted for nearly twelve months. That reminded him of a case which came under his notice in his early days of the wife of a well-known man in Dublin who was a patient of the late Dr. Evory Kennedy. He pronounced her pregnant, but she did not enlarge, and Dr. Kennedy's opinion was scouted. He (the President) also maintained that she was pregnant. She did not give birth to a child, but suffered a great deal of pain, and at the end of fifteen years she expelled the fœtal bones.

Dr W. J. Smyly said that not very long ago ectopic gestation was regarded as a very rare thing, but now the frequency of its occurrence was remarkable. During his late Mastership of the Rotunda he saw a great number of cases of ruptured tubal pregancy, and he operated in more than a dozen cases of it. It was a great mistake to wait for collapse to pass off before proceeding with an operation. Collapse was the result of the spouting of a severed artery. The duty of the surgeon was then to stop the hæmorrhage, and the moment the artery was tied the patient recovered. Whilst the artery was spouting the heart "raced" like the screw of a steamer when it was out of the water, and collapse ensued. Another question of interest was as to the proper line of treatment to be pursued when there were hæmatoceles. If the hæmatocele was not a large one his practice was not to interfere with it, because in the great majority of such cases absorption took place, and the patient got well. But in two of his cases putrefaction of the hæmatocele occurred, and though he performed section, and washed the hæmatocele out, it was too late. If they waited until the blood putrefied an operation was of no use, and, therefore, if the hæmatocele were of any size, the safer course was to open the abdomen at once and clear it out. The most interesting cases were those in which the child went to the full term; he had met with a case in which the child died at the full term, and he removed it afterwards, but, generally speaking, the child was not

alive any where near the term, or beyond the sixth month. His opinion was that it was dangerous to the life of the mother in such cases to wait for the arrival of the full term in the expectation of obtaining a living child. The risk to the mother was enormous, and, generally speaking, such children did not live beyond a month. In one case, in which there was a large six-months fœtus, there was no putrefaction; in another case, which ended fatally, the child had escaped into the abdomen, and became adherent to the intestines. In other cases there was no putrefaction, and he was able to extirpate the cyst. As to drainage, he did not think it advisable.

Mr. Heuston said that he had the pleasure of assisting Dr. Kidd in the two more recent of his cases. When assisting at the case in which the period of gestation was twelve months, the point which struck him most was the nature of the sac within which the fœtus was enclosed, as it presented the usual appearance when the abdomen was opened, of gravid uterus or fibro-myoma, except that it was intimately adherent to the anterior parietal peritoneum. This was particularly puzzling to him, as in the only other case of ectopic gestation which had gone on for a long period in which he had assisted at the operation, the fœtus was perfectly free within the peritoneal cavity, there being no evidence of a sac. This case he would mention more fully as he believed it had not been recorded. It was the case of the late Master of the Coombe Hospital, and the time which elapsed from the first evidences of gestation was eighteen months. On the abdomen being opened the fœtus, evidently a full term one before its death, was floating in a serous fluid free within the abdomen, and there was no evidence of putrefaction. The placenta was found to be intimately attached to the dorsal aspect of the uterus, extending well into the pouch of Douglas. After the removal of the fœtus, a question arose as to whether this should be separated and removed at once or not, and Sir Spencer Wells, who happened to be present, was asked his opinion, but declined to give advice, stating that he had never met with such a case. An attempt was then made to separate it, but as it proved to be very adherent, and had a tendency to bleed, it was decided to allow it to remain in the hope that it would separate itself. With this object, its peripheral portion was stitched to the abdominal wound, closing off the general peritoneal cavity from the wound, and in about a fortnight it came away without any difficulty, and the patient eventually made a perfect

recovery. When the fœtus was examined, subsequent to removal, it was covered by a calcareous capsule about as thick as an egg shell. In reference to Dr. Kidd's third case, the thing which struck him most was the rapid recovery of the patient from the profound state of collapse she was in prior to the operation. He concurred in the generally expressed opinion of the gynæcologists at that meeting as to the necessity of early operation in such cases.

Dr. F. W. Kidd (in reply) said in reference to the question of drainage, and in connection with the first of his three cases, that if he should have to operate again in such a case, he would try to drain through the vagina instead of through the abdomen. They would remember that in his account of the case he said he thought there was a double rupture, viz., a primary one of the broad ligament, and another of the consequent hæmatocele through the lacerations of the broad ligament itself; and it was thought that as they could not close those lacerations there might have been hæmorrhage afterwards from some points, which produced collapse, and turned the scale against the woman. In that case there was so much laceration of the tissue, and the lacerations were so much concealed by thick, clotted blood, like black currant jelly, that there was no way of dealing with them. If there was a clean rupture of the tube, they might leave as much blood as they liked in the peritoneum; but if the broad ligament itself was injured, lacerations of it could not be dealt with unless the blood was cleared away. As to what Mr. Tobin had said in reference to the last case, the woman left the operating table in a better condition than when she was placed on it, and that was entirely due to the stimulus of the saline solution, the volume of which made up for the blood that the patient had lost, and gave the heart something to work on.

Dr. Alfred Smith (in reply) referred to Professor Martin's, of Berlin, method of operating *per vaginam*, and said that he was glad that Dr. Smyly was coming round to the opinion of operating at once. There was no danger in operating at once, but great danger in leaving the case over. They could not tell whether absorption or putrefaction would take place. As to drainage, he had drained all the cases of the kind that he had dealt with, and they all recovered; but he thought drainage *per vaginam* unsatisfactory and had not practised it. As to Dr. Barry's case he (Dr. Smith) had the greatest difficulty in arriving at a diagnosis; but one feature which struck him was the transparency of the

distended horn when exposed. It was like a little balloon, but after the escape of the *liquor amnii* it contracted.

Dr. Smyly explained that he would not be in favour of operating by vaginal method with a patient in a state of collapse. He had drained in some cases and not in others, and in both the patients got on equally well.

Dr. Alfred Smith said his practice was to drain if the peritoneum had been badly treated during the operation.

The President said he could not understand vaginal draining unless the vagina had been opened for the purpose of removing the uterus; nor could he understand a vaginal operation being preferred to one through the abdominal wall.

OBSERVATIONS ON THE ANTICIPATION OF *POST-PARTUM* HÆMORRHAGE, WITH REMARKS ON THE ACTION OF ERGOT ON PREGNANT WOMEN.

By LOMBE ATTHILL, M.D.;
Ex-Master of the Rotunda Hospital, Dublin.

Read in the Section of Obstetrics, February 12, 1897.

A discussion on the subject of the anticipation of *post-partum* hæmorrhage took place at the annual meeting of the British Medical Association held in London in 1873, after the reading of a paper on the subject by Dr. Ewing Whittle, and in the number of the *British Medical Journal* for November 1st, 1873, a paper of mine appeared, in which I say: "Dr. Whittle's paper, though read just before the hour at which the Section adjourned, was listened to with great interest, and a short and animated discussion followed. The reason why this paper was listened to with such attention is obvious. Every practitioner present, from personal experience, dreaded *post-partum* hæmorrhage, and, while admitting the value of transfusion in extreme cases, rejoiced at the prospect of not being obliged to think of so difficult and uncertain a procedure; indeed, more than one member (during the debate which had previously taken place on transfusion) asked—Could no means be suggested for rendering this operation unnecessary? Dr. Whittle's paper professed to be a reply to this query, but I think the subject should be more fully discussed." This I then proceeded to do, and my example was followed by my lamented friend, the late Dr. Alfred M'Clintock, in an admirable paper read before the Obstetrical Society of Dublin, which will be found in the volume of the Proceedings of the Dublin Obstetrical Society for the session 1873-74.

I have no intention of wearying the reader with a summary of these papers. Anyone interested in the subject will find them, and a report of the discussion which followed, in the volume I have referred to; but the question then discussed was, how best to avert the anticipated danger in cases where labour was actually in progress, and though many of the suggestions were valuable, they too often fail to be efficient, because time does not exist to permit preventive treatment to take effect. Thus great stress was laid on the administration of ergot, but I have long since been convinced that, to be of real use, ergot requires not only to be administered some hours before its action as a uterine hæmostatic is needed, but also that the dose must be repeated, and that more than once, at intervals of about two hours, otherwise the effect is uncertain, and so transient, as to be of little value. I do not, therefore, propose to discuss this part of the subject, but to point out that in patients in whom a tendency to dangerous *post-partum* hæmorrhage is known to exist, or indeed is suspected to exist, the danger may in the majority of cases be averted, or at least greatly lessened, by treatment carried out antecedent to the expected date of the occurrence of labour.

I had not been long in practice before I became convinced that the theory then universally believed, that women should not take any drug—especially tonics, such as quinine, iron, and the mineral acids—during the menstrual period was erroneous, and I took every possible opportunity of watching the effect of such medicine on women during menstruation, with the result I expected—namely, that no drug taken in its usual dose had any effect on the function in healthy women. This fact led me to administer drugs during pregnancy when necessary with equal freedom; and in the case of a lady whom I knew to have a tendency to *post-partum* hæmorrhage, I on one occasion administered quinine in 4 or

5-gr. doses up to the advent of labour for the cure of neuralgia, and on this occasion for the first time no hæmorrhage occurred with her. This struck me as remarkable, and it occurred to me that the unexpected freedom from hæmorrhage might have been due to the tonic effect of the quinine on the muscular fibres of the uterus; and, emboldened by the result in this case, I administered quinine to other patients in whose cases I feared the occurrence of hæmorrhage.

About this time the result of the action of ergot in a case of threatened abortion, to which I shall presently refer, induced me to prescribe ergot combined with strychnine for a patient, in whom from previous experience I feared *post-partum* hæmorrhage, for some days before labour set in, and I was gratified by finding that although there was a little hæmorrhage, it was as nothing compared with what had occurred in her previous confinements. From that time it has been my invariable rule to carry out this practice in all cases in which I had reason to fear the occurrence of hæmorrhage, and the results have been most satisfactory. I never once have had occasion to regret its adoption, and never observed the most trifling injurious effects on either mother or child to follow, and this although the ergot has been taken regularly for five or six weeks prior to the occurrence of labour. The following cases are typical ones, and very instructive.

About six years ago Dr. Wright, of Dalkey, sent for me to assist him in a dangerous case of hæmorrhage. More than two hours elapsed between his sending for me and my arrival, and before I did so his exertions had been successful. The hæmorrhage had stopped and the patient's life saved, but she was still in a very precarious condition; and Dr. Wright informed me that her previous confinements had also been attended with alarming hæmorrhage.

About eighteen months subsequently the lady, now

residing in Dublin, requested me to attend her in her confinement which was again approaching, and I reluctantly consented to do so, on the condition that she would submit to a regular course of treatment prior to the expected date of her confinement. She had a great objection to medicine, and was unwilling to agree to this, but on explaining to her the *rationale* of the treatment she consented, and as soon as she had entered on the thirty-fifth week of utero-gestation I put her on the following mixture: Inf. ergotæ ad ℥vj; ext. ergotæ liq., ʒ iij; liq. strychninæ, ʒ j; a tablespoonful to be taken three times a day. This mixture she continued to take regularly for three weeks. I then discontinued it for five days, when I directed it to be recommenced.

This lady had in all her previous confinements (five in number) been taken with labour six or seven days before the expiration of the normal term of 280 days from the cessation of her last menstrual period, but on this occasion labour did not set in till the 288th day, a delay which caused her some uneasiness; but as I had before then remarked that in the case of patients under the influence of ergot the term of gestation was likely to be prolonged, I considered it a good sign, and my prognosis was verified. Labour was in all respects normal; the first stage occupied about five hours, a longer period than usual with her; the second an hour and a half; the placenta was expelled in about twenty minutes, and there was not a wineglassful of blood lost; in fact, I think it was the most bloodless labour I ever witnessed. This lady was again confined eighteen months later; the same treatment was adopted. Labour did not set in till the 285th day; there was no hæmorrhage.

Very recently a similar case occurred to me. A lady of rank wished me to attend her in her confinement. This I refused to do, especially as she resided some miles from town, but I promised her if she arranged with a medical man to

sleep at her house I would go to her if any cause of anxiety appeared. She was the mother of ten children, and in her case also labour usually set in at about a week before the expiration of the normal term of pregnancy. Her two last confinements had been followed by alarming hæmorrhages, and her husband was very anxious about her. I treated her exactly as I had the last case. On this occasion, instead of labour setting in too soon, it did not occur till the 295th day from the date of her last menstrual period; and Dr. Glenn, who attended her, can verify my statement that there was no hæmorrhage to speak of, that the child was vigorous, and that neither mother or child exhibited any ill effects, though ergot and strychnine had been taken with short intermissions for nearly seven weeks.

I might easily quote other cases; but these are sufficient to prove—at least to my satisfaction; (1) That ergot, alone or in combination with strychnine, may be taken with absolute safety to both mother and child by pregnant women, in the usual doses, and for a considerable time. (2) That when taken continuously for not less than three weeks prior to labour it tends to delay the setting in of uterine action, and I may add that in no case have I ever seen it bring on labour in a case in which uterine action had not already been excited. (3) That its exhibition for some weeks prior to the commencement of labour arrests the tendency to *post-partum* hæmorrhage, and facilitates the involution of the uterus.

When I was a student we were cautioned not to administer ergot to women in labour till the os was fully dilated, it having been shown that, unless the child was born within the space of two hours after the specific action of ergot was manifested, that is by the occurrence of short, sharp pains with hardly any appreciable interval, the child was likely to suffer, and was not infrequently born dead. This statement I can verify as being perfectly true, but then the death of the

child was not due to any poisonous property possessed by the ergot, but to the utero-placental circulation being interfered with in consequence of the rapid, almost incessant, contractions of the muscular fibres of the uterus. That this is so was proved by the fact that where the ergot failed to induce its specific effect the child did not suffer. True it is, that, as stated by M'Clintock, some children were born dead even when ergot pains had not been induced, but remember he wrote at a period when the forceps were very rarely used. During the six months I spent as a pupil at the Rotunda, the forceps were never, so far as I know, once applied. Labour was allowed to linger on sometimes for days, and when the fœtal heart ceased to be audible the head was lessened and the woman delivered. Now, perhaps, we run to the other extreme, and apply the forceps too frequently, but that a child should be stillborn whether ergot was given or not, when labour was permitted to linger on for days, is not to be wondered at; but that the death of the fœtus was due to the administration of ergot, when the true ergot pains did not occur, I disbelieve, and this conclusion I arrived at while still a pupil, and its truth I am now convinced of.

The routine of giving a dose of ergot, when *post-partum* hæmorrhage has set in, is generally a harmless, and sometimes a useful, practice. In perhaps one in twenty cases it may induce the uterus to contract, but to be of any permanent use, the drug should be administered some hours previous to the occurrence of the hæmorrhage, and the dose should have been repeated at intervals of a couple of hours or less. If then we meet with a patient in labour in whom a tendency to *post-partum* hæmorrhage has been previously observed ergot should be administered at once, and if delivery does not take place for a few hours, and if the dose be repeated, the result is likely to be satisfactory.

It is to be borne in mind that I am not discussing the

methods by which *post-partum* or any other form of hæmorrhage occurring unexpectedly during parturition should be treated, but that I confine myself to advocating the value of the exhibition of ergot prior to the end of the period of utero-gestation in a certain class of cases, and I am far from underestimating the advantage of rupturing the membranes, the use of friction over or compression of the uterus, cold externally, or hot-water douches when necessity arises, but I wish, if possible, to prevent the necessity for such.

Although foreign to this subject, I wish to state my experience of the use of ergot in cases of threatened abortion. In these hæmorrhage without pain is often the first symptom, that indicates that the ovum is partially detached; when wholly detached hæmorrhage as a rule ceases, and the contents of the uterus are sooner or latter expelled. But it is seldom that we can say with certainty when it has become hopeless to save the ovum, and therefore it is our duty to persevere in our attempts to do so as long as possible; and of all methods to this end, absolute rest in bed for a considerable time is without doubt the best. But it is most irksome to a patient, specially a mother with probably young children needing her care, to submit to the restraint imposed on her by keeping her bed for weeks, and many will refuse to do so; indeed, some women become so prone to abort that it seems useless to try to enforce prolonged confinement to their room, and then it is obviously better that the ovum should be quickly got rid of.

Such a case occurred to me some five and twenty years ago. About that time I had as a patient a delicate young married lady, who in the course of the preceding ten months had twice aborted at about the tenth week of her pregnancy, and on each occasion alarming hæmorrhage had occurred. I attended her on the second of these. She became pregnant again within two months, and at the expiration of almost

exactly the same time as on the previous occasions, hæmorrhage set in, which she knew was the forerunner of another miscarriage. I saw her a few hours later. There were no pains, but the os was patulous, and her state identical with what it had been in the early stage of her previous illness. I came to the conclusion that she must certainly abort, and I at once put her on ergot, with the view of getting rid of the ovum rapidly. The dose of ergot was repeated every two hours, and I watched this lady all day, hourly expecting that she would have a recurrence of the hæmorrhage which had so alarmed her and me on the previous occasion. But instead of this the hæmorrhage lessened; night came on, and she slept. Next day the os was not the size of a split pea. This lady went to the full term and gave birth, to her great joy, to a son, now a strong man 6 feet high.

From that day on I invariably administered ergot generally in combination with strychnia to women threatened with abortion. In some it produced no effect whatever; in a few it induced uterine action, and the expulsion of the ovum followed. In the majority the threatening symptoms disappeared, and pregnancy proceeded normally; but in not one of them did I regret having administered ergot, and I am satisfied that if the ovum is not blighted, that is, ceased to be a living body, that ergot acts as a uterine tonic, and renders the organ in many cases fitted to undergo the further changes which take place in it during utero-gestation, but if the ovum is detached and blighted, then it becomes, as it were, a foreign body, and ergot is then likely to stimulate the uterus to expel its contents. This opinion is, of course, based only on the results of my personal observation, but of its correctness I have no doubt.

CONCLUSIONS.

To sum up the whole subject as to the action of ergot in combination with strychnine, which is the formula I usually adopt, I venture to lay down the following as the result of my experience:—

1. That when administered previous to the termination of pregnancy in the case of women in whom a tendency to *post-partum* hæmorrhage is known to exist, it tends in a marked manner to prevent the occurrence of hæmorrhage.

2. That when so administered in ordinary doses, it does not produce any injurious effect on either mother or child, and that its exhibition seems to delay the commencement of labour in such case.

3. It tends to make the involution of the uterus more perfect, and lessens the chance of the occurrence of subsequent uterine troubles, many of which depend for their cause on imperfect involution of that organ.

4. It will not bring on premature labour or induce abortion unless uterine action has previously been set going.

5. In cases of threatened abortion its administration frequently seems to act as a uterine tonic, and in some cases tends to avert the danger of a miscarriage, provided the ovum be not blighted.

6. That if the ovum be blighted, and specially if it be detached, ergot usually hastens its expulsion.

Since writing the foregoing I observe in the "Epitome" which appeared in the *British Medical Journal* of January 16th, an abstract of a communication made by Professor Schwab on the efficacy of quinine as an oxytocic. This drug, he maintains, "stimulates the uterine fibres when once they have begun to contract of their own accord. Like ergot, it does not set contractions going." I have never administered quinine as an oxytocic during labour, but it will be

remembered that I have stated at the commencement of this paper that it was the unexpected immunity from *post-partum* hæmorrhage in a patient to whom I had administered quinine prior to labour, that induced me to carry out the preventive treatment I now advocate, and that it was quinine I first administered for this purpose. My observations, therefore, tend to confirm the views enunciated by Schwab as to the action of quinine on the uterine fibres, and further observations of the action of quinine as an oxytocic should be made. I do not think, however, it would prove as reliable a drug for this purpose as ergot is. Schwab, too, confirms the opinion I have long held, that ergot does not originate uterine action.

Dr. Horne said he could bear out a great many of the statements in the paper as to the influence of ergot before labour. They used to be taught to avoid administering it before the second stage of labour had commenced. But he had had opportunities of seeing one of the patients to whom Dr. Atthill administered it for some weeks before her confinement, and he could bear out his statement that very little blood was lost. When he was assistant to Dr. Atthill in the Rotunda, the first cases in which ergot was tried were those of abortion; and there was also a case of a woman who had a large sub-mucous fibroma, ergot was administered to her for a considerable time, but it had not much effect in reducing the tumour. The os uteri was then dilated and an incision was made in the capsule of the tumour. Ergot was again given and produced the most violent uterine contractions, and at the end of a week or ten days the tumour was expelled through the cervix uteri, and was removed. He thought therefore that the administration of ergot before uterine action set in had very little effect. The great danger in using it was when the membranes had ruptured, and the waters had escaped. The tonic effect of the ergot was then likely to stop the circulation of the fœtus and cause its death.

Dr. Alfred Smith, said the rule he used to follow when he was in the Rotunda under Dr. Macan—and which he had since

followed himself—was this:—If the patient gave a history of previous *post-partum* hæmorrhage, they always examined the urine for albumen, and if they found it they concluded that there was a tendency to *post-partum* hæmorrhage. His present practice in such cases was to treat the patient for albuminuria. The great danger was in the third stage of labour. On the proper management of that stage depended the chief security against *post-partum* hæmorrhage. He (Dr. Smith) had never had in private practice a case of *post-partum* hæmorrhage where the labour was otherwise normal. He had seen severe cases of it in the Rotunda when he was a student; but rarely when there was proper attendance in the third stage of labour. The mixture of ergot and strychnine which Dr. Atthill used, he (Dr. Smith) frequently used in cases of threatened abortion or miscarriage. He formerly dreaded using ergot in any large quantity; but he was glad to hear from so distinguished an authority as Dr. Atthill that that could be done with safety. Anyone who had seen ergotine injected in fibroid tumours must be aware that it caused pain.

Dr. Ernest Tweedy said that at the present day gynæcology was tending to become a surgical science. They were apt to give up medicines altogether, and that, more than they should. They met many cases of *post-partum* hæmorrhage; and he believed that what gave rise to it was endometritis. His own experience was that it was to that that *post-partum* hæmorrhage was nearly always due. He would ask Dr. Atthill did he think ergot a useful drug to administer in cases of endometritis.

Dr. F. W. Kidd said he had had some experience of Dr. Atthill's administration of strychnine and ergot in cases of anticipated post-partum hæmorrhage. As to quinine, a certain amount of regard should be paid to experience of the use of that drug in other countries, and especially in India, where it was very much used in large quantities in cases of malarial fevers. His impression was that in the early stages of pregnancy they avoided quinine, but that in the latter stages it was not supposed to have any injurious effect on the pregnancy. Since his student days he had seen but one severe case of *post-partum* hæmorrhage. As to the administration of ergot in hospitals, it should be borne in mind that the ergot they got in hospitals was supplied by contract, and was often unreliable. Dr. Tweedy had said that all the cases of this hæmorrhage that he had seen were due to endometritis. How could he prove that? He (Dr. Kidd) believed that

some students acquired the habit of resorting too soon in the third stage of labour to Credé's method of expelling the placenta, and that that practice was a very prevalent cause of *post-partum* hæmorrhage. He admitted that in earlier years he had himself fallen into the practice which he now condemned.

Dr. E. Tweedy in explanation said he understood Dr. Atthill's paper to be entirely confined to cases of atonic hæmorrhage in which there had been no tearing of the cervix. And he believed that such hæmorrhage was always due to endometritis. Myoma and kidney diseases were causes of *post-partum* hæmorrhage, but only because they gave rise to endometritis, which was almost always the cause of a bleeding uterus.

Dr. Atthill, in reply, did not say that either ergot or strychnine were absolutely efficacious to prevent *post-partum* hæmorrhage; but if administered at the proper time, where a tendency to such hæmorrhage was known to exist, they tended in a marked way to prevent its occurrence. One thing of which he was certain was that the mixture he recommended tended to prolong the period of gestation. That was proved by the case he had mentioned of the lady who had ten children, and who had a tendency to be always confined before her time. The case showed that ergot had some specific action on the uterus. He believed that it strengthened the uterine fibres, and caused them to contract, and thus prevent or arrest the hæmorrhage. In his early days it was medicine, and medicine only, for this hæmorrhage; that existed to a certain extent still; but at the present day the majority of them were sceptical about the action of medicine, and no one was more sceptical than himself. But although he was a sceptic he was not an unbeliever. Medicine properly administered was most useful; and if its results were sometimes unsatisfactory, it was because they did not watch its effects in particular cases sufficiently, but followed like sheep a prescribed line of treatment. In cases of neuralgia the action of quinine was beyond all doubt. In the same way ergot when properly administered was a most efficient drug; and what he asked the members to do was to make trial of it. But it would not excite uterine action unless there was a foreign body in the uterus. His observations about the preventive treatment of *post-partum* hæmorrhage were based entirely on private practice; for hospital practice did not afford opportunities of watching the patients. Quinine he had not tried. He was afraid he could not agree with what Dr. Tweedy had said as to endometritis being invariably the cause of this hæmorrhage.

At least he did not go so far as to say that it was the invariable cause. But he was prepared to say that ergot was absolutely useless in cases of endometritis. Perhaps he was not as good an obstetrician formerly as he could claim to be now; but he had had patients dying of *post-partum* hæmorrhage in which endometritis could not possibly have arisen. He believed a great deal depended on the treatment of the third stage of labour. He had no preconceived ideas when he began this treatment; and his paper was founded on most careful observations made during 25 years. Everyone might draw erroneous conclusions; but he could say with confidence after fifty years' practice that he never put forward any treatment which, he was more convinced, was—not absolutely certain—but useful than that which he now advocated. It would give satisfaction in the majority of cases, would reduce the size of the uterus, and prevent sub-involution, which was the *fons et origo* of many ills.

CASE OF SYMPHYSEOTOMY

By S. M. THOMPSON,
Visiting Physician, South Dublin Union Hospital.

[Read in the Section of Obstetrics, March 19, 1897.]

M. A., aged twenty-eight, primipara; admitted into Maternity, South Dublin Union, May 26, 1896. Small rachitic pelvis, conjugate diameter less than three inches; promontory of sacrum very prominent. Forceps applied in second stage ineffectually, it was determined in consultation to try symphyseotomy. The parts being cleansed and rendered aseptic, an incision about one inch long was made at junction of skin and mucous membrane inside vulva sufficient to admit index finger, and by means of which the bladder and retro-pubic structures, and also those in front, were separated from the bone; after which a small scalpel was passed in, protected by the finger, and the ligaments divided—the upper from above downwards and inwards, and the lower from below outwards—when the child was easily brought down by version.

There was much rupture of perinæum and tumefaction of the soft parts from use and slipping of forceps (Neville's) which required stitching and one stitch in incision, the whole parts being kept antiseptic by pads of cotton soaked in solution of creolin.

Under care of Dr. G. Macnamara, Physician to Maternity, her recovery was uninterrupted, union being evidently perfected by rather tight binding. There was not a teaspoonful of blood lost in the procedure, in fact it was practically bloodless, which is one of the points which are worthy, in my opinion, of notice in this method, besides its simplicity, as well as the strength given to the pubic structures by non-division of the skin and subjacent tissues, as usually advised.

She was kept in bed for a month, and discharged from the Maternity in two months, and ten months after (March 17th, 1897) is still at work, and strong and hearty.

NOTES ON A CASE OF INCOMPLETE ABORTION.

By HENRY JELLETT, B.A., M.D., B.Ch., B.A.O. Univ. Dub.;
Assistant Master, Rotunda Hospital.

[Read in the Section of Obstetrics on March 19, 1897].

THE following case, involving as it does an important question in midwifery, is, I think, of sufficient interest to warrant this paper:—

CASE.—E. O., aged thirty-seven, 12th pregnancy, was attended by one of the students of the Rotunda Hospital at her own home on November 25 last. When he arrived he found the patient bleeding profusely, and at once plugged the vagina and brought her into hospital. I was called to see the patient immediately after her admission, and found her in an apparently normal condition. Her pulse was about 80, full and strong; her temperature 99° F.; her face was rather pale, but this was her natural condition. In short, she had no symptoms of having suffered from any serious loss of blood. As I had some reason to doubt the aseptic condition of the vaginal plug, I removed it at once, and douched the vagina freely with creolin lotion. There was no blood on the plug, and no bleeding followed its removal. A bimanual examination then revealed the following conditions:—The uterus was completely retroverted, the cervix directed upwards towards a point an inch or two above the upper margin of the symphysis; the uterus was about the size of a three months' pregnancy; it was easily replaceable, and no hæmorrhage followed its re-position; the cervix was of normal length, the external os admitted the tip of the index finger, the internal os was apparently closed; there was no portion of ovum or clot protruding from, or lying in, the cervical canal. I came to the conclusion that it was either a case of threatened or complete abortion—most probably the latter. I believed it to be most probably the latter, because there was no hæmorrhage of any kind—not even a drop of blood escaping from the uterus during my examination; also because the internal os was apparently contracted, while the external os remained somewhat dilated. In either case digital or instrumental exploration of the uterus appeared

to be contra-indicated; as, if the case were one of threatened abortion, exploration would do harm, while if it were one of complete abortion exploration was unnecessary. I inquired into the nature of the matter that had been expelled from the uterus previous to admission, but could ascertain no particulars concerning it. Accordingly, the patient was put back to bed and I gave directions that she was to be kept as quiet as possible. An hour after this I was sent for hurriedly, and reaching the labour ward I found the patient collapsed and pallid, with a heart so feeble that her pulse was imperceptible at the wrist; she was obviously suffering from extreme collapse. She was bleeding freely, and the bed on which she had been lying contained a pool of blood. The hæmorrhage had come on with the greatest suddenness. The nurse had looked at the patient a few minutes previously to see if she were bleeding, and found that she was not. A couple of minutes later the patient called for assistance, and then the blood was found to be pouring from the vagina. I placed her in the cross-bed position, douched the vagina, and as rapidly as possible explored the uterus with a Rheinstadter's flushing curette, the os not being sufficiently dilated to admit the finger. With some little difficulty I extracted with the curette a piece of placenta about one and a half inches square. As there was still some hæmorrhage, and as I did not dare to allow the patient to lose any more blood, I plugged the uterus as rapidly as possible with iodoform gauze. A couple of times during the operation, which altogether did not take more than ten minutes, I believed the patient to be dead. While the curetting was proceeding the usual stimulants were administered; whisky was given by the mouth, ether was hypodermically injected, and, as soon as the plugging was finished, the foot of the bed was raised and the patient kept in this position for some hours. She rallied from the collapse quickly, the plug was removed next day, and the patient left the hospital, though against advice, on the sixth day.

The foregoing are the facts of the case, and I should now like to make a few remarks as to their significance. There seems to me to be but little doubt that this patient would have died if she had not been in a hospital—that is, if medical assistance had not been immediately available. There also seems to be but little doubt that this serious hæmorrhage, with its resultant collapse, would not have occurred if the

cervix had been dilated and the uterus explored in the first instance; as, in that case, the portion of placenta would have been discovered and removed. It is obviously impossible that in general practice every patient could have a doctor in as immediate attendance as happened in this case. Are we then, reasoning from it, to say definitely that the uterus must be explored in any case in which a pregnant woman has had an attack of hæmorrhage? I, for one, would be distinctly opposed to any such conclusion being come to. Many patients have an attack of hæmorrhage during the early months, who are subsequently delivered at full time; and many patients deliver themselves of complete abortions without there being the slightest necessity for subsequent exploration of the uterus. If we make it our practice always to explore the uterus we shall undoubtedly cause many unnecessary abortions in the former class of case; in the latter class we shall expose our patient to a very considerable risk of sepsis, for which there will not always be compensatory gain. On the other hand, we shall benefit materially, or perhaps even save the lives of such patients as the one whose case I have laid before you.

There are, I think, three general indications for the exploration of a pregnant uterus in the early months:—

First, if the patient have lost so much blood from the uterus that we consider it undesirable that she should lose any more.

Secondly, if any portion of the ovum have come away, whilst the remainder of it is retained *in utero*—*i.e.*, if it be a case of incomplete abortion.

Thirdly, if the ovum be manifestly dead, but be not expelled—*i.e.*, if it be a case of missed abortion.

In the presence of these indications, our line of treatment is clear; in the absence of them, we adopt the expectant treatment, with the object of clearly ascertaining the nature

of the case. Taking the foregoing indications as true, the crucial point lies in the correct diagnosis of the condition of affairs present. How can we decide whether the case be one of threatened, complete, or incomplete abortion? There are three points which help us to arrive at a conclusion—

First, the nature of the matter which has been expelled from the uterus.

Secondly, the total cessation or the continuance of hæmorrhage.

Thirdly, the shape of the cervix.

Of these three, by far the most reliable is the first, if we examine *all* that has come away. By so doing we can, in the majority of cases, decide at once if we be dealing with a case of abortion, and, if so, what particular variety it is. I repeat again, if we be dealing with a case of abortion, as it not uncommonly happens that what we believe to be such a case is in reality a case of extra-uterine pregnancy, the fact that the hæmorrhage has or has not ceased is a very negative sign. If the hæmorrhage continue, we may be sure that the uterus is not empty. On the other hand, its cessation is by no means an absolute proof to the contrary. Then, as to the shape of the cervix—this is altered accordingly as the internal or external os is contracted or dilated. In a case of threatened abortion, the internal os is usually more dilated than the external, as is shown by the widening of the cervix at the cervico-vaginal junction. In a case in which the ovum has been expelled, the opposite condition is found—*i.e.*, the external os is usually more dilated than the internal. This, also, is a negative sign; as, in some cases, when a portion of the ovum has been expelled the internal os contracts again after its expulsion.

If we apply the foregoing method of diagnosis to the case in point, we find that the first and most reliable guide to the condition of affairs was impracticable, as

there was no opportunity of inspecting the matter that had been expelled. The two last guides had to be relied upon, and they both tended to show that the uterus was empty, inasmuch as the hæmorrhage had entirely ceased and the internal os was less dilated than the external. I submit, then, that the treatment indicated was rest in bed, but how disastrous and how nearly fatal this treatment proved I have mentioned. Excluding the possibility of a mistake in diagnosis, which might and which ought to have been avoided, I think that one of two conclusions is forced upon us. Either, it is necessary to explore the uterus in every case of hæmorrhage in the early months; or, this case is to be regarded as one which is entirely exceptional, and from which no general principle can be deduced. I have given the reasons on account of which I am opposed to the first conclusion; accordingly, I see no alternative except the second. The vital importance of one point is thrown into strong relief. We should insist that everything which is expelled from the uterus be kept for our inspection, and we should examine such dejecta thoroughly.

INTRALIGAMENTOUS FIBRO-MYOMA STRANGULATED BY PROTUSION THROUGH INGUINAL CANAL.

By ALFRED J. SMITH;
Examiner in Midwifery, Royal University of Ireland;
Gynæcologist, St. Vincent's Hospital.

[Read in the Section of Obstetrics, April 23, 1897.]

On February 6th Surgeon M'Ardle sent for me. When I arrived at the theatre, St. Vincent's Hospital, he demonstrated to me a large hernial opening, and on his making pressure over the pubis, a liver-coloured tumour the size of a large orange came down through the opening; it returned quite easily. I introduced my finger, and found the tumour connected with the uterus. The history of pregnancy, the appearance of the tumour, and its elastic feel gave the impression that we had to deal with an ectopic gestation, probably in the cornu of a bicornis uterus.

Accordingly, through the kindness of Surgeon M'Ardle, I made an abdominal incision in the median line, between the umbilicus and symphysis pubis, and retracted the abdominal walls to see the exact nature of the tumour and define its limits. The liver-coloured appearance, and the elasticity of the tumour, were most remarkable, and extremely like a tubal pregnancy cyst greatly distended with blood, and I noticed that the handling of the tumour did not cause any rhythmic contractions. On closer inspection I found that I could differentiate two masses—one was more or less pedunculated, and was evidently the portion that had descended into the hernial sac, and the other filled the right side of the cavity of the pelvis, and was firmly wedged there; the two masses were united together by a broad base. I formed an artificial pedicle close to the uterus, and placed around it a stout silk ligature with a large Tait's needle. Having tightened this provisional ligature I incised the capsule to determine the nature of the contents, and found it was not a cyst but a soft œdematous tumour, the tissue of which tore easy with the finger. My course was then clear. I removed the pedunculated lobe, and rapidly enucleated the

remaining portion out of the folds of the broad ligament. The pedicle stump was so large I removed a wedge-shaped slice from its centre, and brought the surfaces together with deep interrupted silk sutures.

Professor McWeeney kindly examined the specimen. He reports as follows:—

"The specimen consists of two good-sized pieces of tumour tissue, the larger of which is made up of two parts as big as good-sized oranges; these are covered with a shiny membrane resembling peritoneum. The other piece of tumour has adherent to it the ovary and Fallopian tube, and from the nature of the relations it seems to have lain between the layers of the broad ligament.

"*Microscopically* the appearances are what might have been expected from the naked-eye appearance, which was grey and gelatinous, with fibrous bands running in all directions. Fibrous tissue and unstriped muscle are imbedded in a matrix, which has undergone extensive mucoid change. Of sarcoma there is no obvious trace. Hence the diagnosis would be intraligamentous fibro-myoma undergoing mucoid degeneration."

The case is, I think, remarkable for the following reasons:—

1st. The difficulty in diagnosing the nature of the tumour.

2nd. The presence of an intraligamentous uterine fibro-myoma in an inguinal hernial sac.

After an exhaustive search I cannot find recorded a similar case.

The patient's recovery was rapid and uneventful.

THE USE OF ERGOT IN OBSTETRICS.

By THOMAS MORE MADDEN, M.D., F.R.C.S.E., M.A.O.;
Obstetric Physician and Gynæcologist, Mater Misericordiæ Hospital, Dublin;
Consultant and Ex-Master, National Lying-in Hospital.

[Read in the Section of Obstetrics, April 23, 1897.]

THE position of the practitioner who, after an extended obstetric experience, finds himself returning, as I now do, to a question, such as the use of ergot in obstetrics, in the discussion of which he has previously taken part, and which long before he entered the profession, or the world, had been well debated and apparently settled, may perhaps serve to recall the task of Sisyphus as described by the poet—

> "With endless endeavour,
> For ever, for ever,
> Is Sisyphus rolling
> His stone up the mountain."

Nevertheless, that it is not so superfluous as it might thus seem to reconsider this subject at the present time can, I think, be easily proved.

In few respects are the changes effected in midwifery practice since my student days more marked than with regard to the obstetric use of ergot. At that time this drug was very generally, and often with too little discrimination, given in the majority of labour cases. A few years later the reaction which was inevitable against such a malpractice set in; and this has continued to operate and increase up to the present time, when, the pendulum of professional opinion having swung back to the opposite extreme, comparative desuetude has replaced the former abuse of the most potent ecbolic within our command.

That result has been fostered by the teachings of some

recent writers, whose commonly accepted views have led to the general abandonment even in, as I think, appropriate cases of the obstetric employment of ergot by the rising generation of practitioners. For, if the doctrines on this point so expounded—and which as my own experience as an examiner and a consultant in this branch of medicine has shown me are largely adopted by my junior colleagues—may be taken as a sufficient indication, there can be no doubt that the trend of modern midwifery opinion is distinctly adverse to the administration of ergot during labour. Thus, for instance, Dr. Playfair, whose authority on this point is widely conceded, speaking of the use of ergot in tedious parturition, says—"Its effect is indeed to produce that very state of tonic and persistent uterine contraction which has already been pointed out as one of the causes of protracted labour."[a] Professor Lusk observes—"Ergot should never be exhibited in the first stage of labour. . . . We should also abstain from the use of ergot in the second stage unless it seems necessary as a prophylactic against *post-partum* hæmorrhage."[b] Dr. Winkell is opposed to the employment of ergotin in obstetrics, and allows the use of ergot only in homœopathic and, as I believe, utterly inefficient doses. "It will be seen," he remarks, "that ergotin cannot be used very often. On the contrary, I have recently prescribed the fluid extract in 12-drop doses."[c] Still more emphatic, however, is the condemnation of ergot in labour cases pronounced by Dr. Hosacks, who observes "that the designation of *pulvis ad partum* applied to it in some of the old works on obstetrics might fairly, as regards the child, be modified to *pulvis ad mortem.*"

Whether the views thus formulated and the reaction so

[a] Playfair. Science and Art of Midwifery. Vol. II. P. 10.
[b] Lusk. Science and Art of Midwifery. Pp. 461. London. 1896.
[c] Winkell. Text-book of Obstetrics. P. 513. Edinburgh. Edition 1890.

effected against the use of ergot during parturition are altogether correct in theory and advantageous in practice, or not, may be now briefly considered.

Physiological Action of Ergot and its Constituents.—In discussing the obstetric use of ergot, the physiological action of its various constituents cannot be altogether omitted from consideration. On the latter point it must, I think, be admitted that opinions which by some authors of obstetric text-books have been adopted, from the published researches of recent scientists, who, in the physical laboratory, have investigated the composition as well as the action on lower animals of the several constituents of ergot, are by no means conclusive or identical with the results of clinical experience of the same agents in the case of parturient women. As a matter of fact, neither the chemical composition of ergot, nor the effects of its several products, are as yet determined, for, as Mr. Squire has observed in the last edition of his work, the chemistry of ergot is so complicated, and the workers so utterly at variance both as to its chemical constituents and their physiological action, that it is impossible to lay down any definite lines on which its Galenical preparations should be made.* In his lecture on this subject Professor Plowright cites Kobert (who, however, has since been flatly contradicted by Tanneret), and, according to that authority, the active constituents of ergot are ergotinic acid, sphacelinic acid, and cornutin. The first named is the principal constituent of Dragendorff's sclerotinic acid, and is also contained in Bonjean's ergotin, and in our official liquid extract. When injected subcutaneously it reduces the blood-pressure and gives rise to nervous derangements, such as inco-ordinate movements, loss of the reflexes, paralysis; and it causes death

* Squire. Companion to the British Pharmacopœia. Sixteenth Edition. London. 1894.

from failure of the respiratory process. It is without action on the uterus; when taken by the mouth it becomes split up into inert by-products, so as to be without action on the animal organism.

Sphacelinic acid, on the other hand, is a very energetic poison; it is the gangrene-producing constituent of ergot, insoluble in water, dissolved with difficulty in alcohol, but soluble in oils, chloroform, and ether. Fowls fed on it, made into pellets with meal, soon showed gangrene of the combs and wattles. Sphacelinic acid causes gangrene by inducing a hyalin thrombosis of the arterioles, at first acting locally, but afterwards by being absorbed. *Post-mortem* changes, consisting of follicular catarrh of the mucous membrane of the œsophagus, crop, and stomach, while numerous extravasations are found all along the alimentary canal in fowls which died from its effects.

The alkaloid cornutin Kobert considers to be the only ingredient suitable for therapeutic use. It is soluble in alcohol, and its chloride and citrate in water, $\frac{1}{32}$ milligramme, killed a strong frog in a few minutes. With dogs and cats, in the proportion of 5 milligrammes to the kilogramme, a peculiar and distinctive train of symptoms is induced, consisting of tremors or quivering of the body, salivation, evacuation of the contents of stomach and bowels, with great straining. The straining recurs at intervals of a few minutes, accompanied by the expulsion of flatus, fæces, and bile. The cardiac action is retarded and irregular. A large dose causes clonic—becoming tonic—spasms, resembling epileptiform convulsions, the similarity to which is heightened by the tongue of the animal being frequently bitten. Death arises from respiratory failure, which ceases before the heart's pulsations. In pregnant and non-pregnant animals it causes wave-like contractions of the uterus, but not "tetanus uteri." It acts on this organ through the lower

part of the spinal cord; it raises the blood-pressure, but does not cause gangrene. Kobert considers that it is best administered in a sterilised solution. He further adds that the ergot produced in France and Spain is richer in sphacelinic acid than that of Germany and Russia; while the latter is richer in cornutin, which accounts for gangrenous ergotism being more prevalent in France and Spain, while convulsive gangrenism occurs in Germany and Russia.[a] The foregoing statements may be regarded as sufficient evidence of the views now generally held with regard to ergot and its action, and also serve to support my contention that the dicta of scientists on this subject can by no means be unreservedly accepted by obstetric practitioners, by many of whom, as well as by myself, preparations such as the "*B. P.* fluid extract of ergot," and Bonjean's ergotin, both of which, according to Kobert, contain a toxic constituent of deadly potency, in the case of some of the lower animals, have long and largely been employed in midwifery cases, without, when judiciously used, producing any toxic effects whatever.

The dangers ascribed to the employment of ergot during parturition by the writers above referred to, or by others, include—1st, its possible fœticidal effects; 2nd, the probability of this ecbolic giving rise to such irregular uterine action as to occasion subsequent retention of the placenta; and 3rd, the direct toxic action of the drug on the maternal system.

With regard to the first of these objections a sufficient answer has been supplied by the actual results of the employment of ergot for some time before parturition, as recorded long since by my former colleague, the late Dr. Denham, when Master of the Rotunda Hospital, and more recently and conclusively by our distinguished President,

[a] Plowright. Lecture on Ergot, &c. Lancet. April 17th, 1890.

Dr. Atthill, whose observations are too fresh in our recollection to require any further reference to them in this place.

The Present Writer's Clinical Experience of Ergot.—As to the second and third of the reasons assigned, as just mentioned, for the non-employment of ergot in midwifery cases—viz., the probability of its inducing irregular or hour-glass contraction of the uterus, and so occasioning placental retention and its alleged maternal toxic action—I know not how I can more effectually deal with such objections than by a short reference to my clinical notes.

Having, however, employed ergot in a very large number of instances in my hospital and private practice during the past twenty-six years, within which period I for some time occupied the position of Master of one lying-in hospital and Assistant-Master of another, it would involve a probably useless waste of time and labour, and occupy more space than might be desirable, were I to recapitulate my record of all the obstetric occasions in which I have administered this drug. It may, therefore, suffice to submit here a brief statement of the circumstances under which, in a series of one hundred and fifty midwifery cases, ergot, including any of its preparations, was found necessary, together with the results of its exhibition in each instance.

Abstract of One Hundred and Fifty Obstetric Cases in which Ergot was used.—In seventy of these cases the patients were primiparæ; in eighty they were pluriparæ. Of the one hundred and fifty patients referred to, one hundred and forty-eight recovered and two died—viz., one from septicæmia and the other from a disease that commenced prior to parturition—viz., typhoid fever.

In ninety-five of these cases the drug was given before the birth of the child—viz., in fifteen for delay occasioned by inertia of the uterus in the first stage of labour; and in eighty, for delay similarly caused, or for the prevention of

hæmorrhage, or for some other complication, in the second stage. In ninety-two of these instances the children were delivered alive, either by uterine action or by the forceps. In three they were stillborn, and in two of the latter cases evidence of putrefaction being apparent on delivery no toxic effect could possibly be ascribed to the ecbolic administered a short time previously.

Of the ninety-five cases in which ergot was given in the first or second stages, in eighty-six the placenta was subsequently expelled by the natural efforts; in nine its removal had to be assisted by the obstetric attendant—viz., in four cases for morbid adhesions, in four for atony of the uterus, and in one for irregular or hour-glass contraction.

In fifty-five instances the ergot was given after the birth of the child—namely, in twenty-five during the third stage to hasten the expulsion of the placenta, or to prevent flooding; and in thirty immediately after the completion of labour, for the prevention or arrest of *post-partum* hæmorrhage, or for some other reason to stimulate uterine contraction.

Whilst, therefore, my own experience, as above summarised, points to the conclusion that the objections urged against the employment of ergot during labour are to a large extent devoid of substantial foundation, provided always that the drug be judiciously used, at the same time I, for one, have no desire to minimise the dangers to either mother or child that may result from its abuse. On the latter point more especially I may repeat, as I observed long since in a former paper, that under no circumstances should ergot or ergotin be given until the os uteri is fully dilated, or so dilatable as to allow delivery to be effected with the forceps—if the child be not expelled within an hour after its administration, or sooner, if any necessity for so doing should arise; as, otherwise, the "fœtal circulation might very probably become

arrested by the tonic or unremitting uterine action which is the characteristic effect of this drug." That effect was also referred to in another paper of mine, in which I instanced the fact that in a series of cases, brought within my cognisance, in which ergot had been injudiciously too early used before the application of the forceps, a large proportion of the children, thus delivered were stillborn. Hence I would as soon entrust the use of the forceps to a student commencing midwifery attendance as allow him or a nurse to administer ergot until fully acquainted with the principles which should direct its employment, and the dangers that may result from its improper exhibition. At the same time, however, it is obvious that the effects, however disastrous, of the abuse of any remedy cannot be regarded as an argument sufficient to outweigh the clinical record of the benefits derivable from its judicious use. I may, therefore, take this opportunity of pointing out that, in my own lengthened experience of the administration of ergot in midwifery practice, I have not met with distinct evidence of those disastrous effects in any instance in which it had been properly employed. Therefore, I have no hesitation in expressing the belief that the injurious action ascribed to this remedy should to a large extent be attributed to its misuse. For instance, if ergot be given at too early a period of labour, or in the small, insufficient, and frequently-repeated doses that are now suggested, a state of irregular contraction of the uterus is likely to be induced, by which the circulation of the fœtus may be imperilled, whilst, at the same time, the dilatation of the os uteri may be arrested. On the other hand, in cases of head presentation delivery being impeded only by inertia, if ergot or ergotin be administered when the os uteri is sufficiently dilated, and is then administered in the bold, full and effective dose that I have long recommended, the result, in the majority of cases, will be the establishment

of that effective uterine action, the temporary cessation of which is the most common cause of delay in the second stage of labour, and the consequent speedy and safe delivery of the child.

The Conditions and Circumstances under which Ergot may be employed in Obstetrics.—Under this heading, as will be seen, I ascribe a far wider range of utility to ergot in midwifery practice than is generally recognised. Nevertheless, I would presume to observe that my views on this point are the results of actual clinical experience, which it may not be easy to disprove by any merely theoretical objections however strongly expressed.

Judging from the recent literature of the subject it apparently is not superfluous to reiterate that to use any of the preparations of ergot safely and efficiently in the labour cases referred to it is essential—1st, that the presentation should be natural or cranial, except in some instances of breech presentation, wherein inertia must be dealt with; 2nd, that there should be no disproportion between the fœtus and mother, nor any other physical obstacle to delivery in the genital tract; 3rd, that the os uteri, if not previously fully dilated, should be sufficiently dilatable to allow of speedy delivery by the forceps whenever that is necessary; 4th, that the preparation of ergot selected, the dose in which it is given, and the method in which it is employed should be well calculated to secure the desired effect.

Subject then to the foregoing conditions ergot may with utility be employed before, during, and after the second stage of labour—that is to say, it can be thus given before the full dilatation of a dilatable os, in some instances of long delay from inertia of the uterus, in which there is either (*a*) evident danger to mother or child, or (*b*) risk of subsequent hæmorrhage from further protraction of the case. In the second stage it may be employed (*c*) in all cases of labour

rendered abnormally tedious by defective uterine action, in which the presentation is natural and no other impediment to delivery existent; or (*d*) for the prophylaxis of apparently impending hæmorrhage, as well as for some other complications. During the third stage ergot may be resorted to (*e*) for the expulsion of a placenta retained by inertia; or (*f*) for the arrest of excessive loss of blood. After labour this ecbolic may be exhibited either immediately (*g*) to check or prevent flooding, or subsequently (*h*) to produce such tonic or permanent contraction as will seal up the uterine vessels and so lessen the liability of bacteriological invasion or sepsis; or (*i*) for the purpose of expelling clots and so arresting after-pains. Lastly (*j*) in the majority of multiparous patients ergot can with advantage be given during the puerperal state with the object of stimulating the muscular contractibility of the uterus, and thus aiding the process of involution.

Ergot in the Prevention and Treatment of After-Pains.—Many years ago, on the suggestion of the late Dr. T. Beatty, ergot was largely employed in the Dublin School of Midwifery for the prophylaxis, and in the treatment, of after-pains. From experience I can bear the strongest testimony to the value of that now generally forgotten method of arresting this trouble. In such cases the ergot or ergotin may be employed in a similar manner and dose, as in instances of delay from uterine inertia in the second stage of labour, or in those of *post-partum* hæmorrhage. In the former cases the ergot probably acts, as conjectured, by causing a perfect and permanent contraction of the muscular fibre of the uterus, and so preventing the formation within its cavity of those clots by which the spasmodic action is stimulated in cases of after-pains.

Method of Employing Ergot in Obstetric Cases.—The dose of ergot to be given must, of course, depend on the particular circumstances of the case, as well as the preparation selected

in each instance. At the same time I may observe that in whatever form ergot may be resorted to as an ecbolic in any suitable cases of delay from uterine inertia in the latter stages of labour, or for the prevention or arrest of subsequent hæmorrhage, it should be always administered in a dose sufficiently large to secure prompt, active, and permanent uterine contraction. And, secondly, that under no circumstance should this drug be given in midwifery practice in those small, utterly inefficient and repeated doses which are now recommended by some writers, and which, in my opinion, are calculated, by producing irregular and evanescent waves of muscular contractibility, to do more harm than any possible good.

With regard to the most suitable preparation of ergot for obstetric use there have been almost as many different opinions as writers on the subject. In my early days an extemporaneous infusion of the freshly-powdered drug was most generally employed, and, though troublesome to prepare and nauseous to take, was of unquestionable ecbolic activity. This in turn was replaced by the more palatable and equally effective official liquor ergotæ of the British Pharmacopœia, or by a glycerine solution such as Long's, which, twenty-five years ago, when I was Assistant-Physician to the Rotunda Hospital, was as largely and efficaciously employed as any of the later preparations of ergot. To the value of some of these, and more especially of Bonjean's ergotin, Burroughs and Wellcome's tabloids of ergotin or its citrate, and Oppenheimer's ergol, I can speak from experience of their use in many instances. At the same time, however, I must confess my possibly antiquated predilection for the freshly prepared liquid extract of the Pharmacopœia. This, in the cases mentioned, during or immediately after labour, I have generally employed in doses of from two to three drachms by the mouth, together with a drachm, or even two if necessary—

at the same time—by deep hypodermic injection in the gluteal region.

In the treatment of after-pains, or to secure such firm and permanent uterine contraction after delivery as may aid in safeguarding the patient against puerperal sepsis, or subsequent sub-involution, I have generally found drachm doses of liquor ergotæ, given thrice daily in combination with tincture of nux vomica and citrate of iron and quinine, most serviceable. To act thus efficiently and safely in any of the instances that have been here referred to, it should be hardly necessary, in conclusion, to observe that ergot or ergotin, like all other active drugs, must be judiciously employed, or, in other words, should be given only in suitable cases and conditions, at the proper time, in efficient doses, and with due precautions.

Dr. Alfred Smith said that he was rather surprised that Dr. Madden should advocate ergot. Formerly ergot was largely used, but latterly he had not used it at all.

Dr. Horne said that his experience corresponded greatly with Dr. Smith's. Some years ago he had been in the habit of using ergot, but latterly he had practically given up ergot altogether, except in cases of severe *post-partum* hæmorrhage occurring in the third stage of labour. The one great objection to it was that when given by the mouth in sufficiently large doses intense sickness was produced. He did not consider it of much use in the first or second stage of labour. If used at all, he preferred to use it hypodermically.

Dr. Kidd considered the question about the use of ergot a very important one. He was not prepared, he said, to join either side as an extremist. He would be sorry to use ergot in the number of cases in which Dr. Madden used it, and he would be sorry to discard it altogether. The principal use to which he put ergot was after the completion of labour and during convalescence. With regard to the question of inertia, there are many other means to hand just as good as ergot, and they had not the dangers which

were attributable to ergot. He had never found any of the preparations of ergot to act quickly enough in those breech cases to which Dr. Madden had referred, and in which time was of value. He had found the liquid preparations of ergot as supplied to hospitals extremely unstable and unreliable, and thought ergotine and ergol much more reliable. He believed that ergot should not be used during the first or second stage of labour unless in the case of a woman who was known to be a habitual bleeder. Ergot combined with opium was useful in relieving after-pains.

Dr. More Madden replied.

NOTES OF A CASE OF HÆMORRHAGE INTO THE BROAD LIGAMENT ARISING FROM THE STUMP OF AN OVARIAN CYST, AND COMPLICATING THE PUERPERIUM.

By J. H. GLENN, M.D., B.Ch., Dubl.;
Ex-Assistant Physician, Rotunda Hospital.

[Read in the Section of Obstetrics, May 28, 1897.]

Some rather unusual features in the following case will, I hope, be of interest, and must be my apology for bringing it before the Academy. In January, 1894, through the kindness of Dr. Smyly, then Master of the Rotunda Hospital, I removed a left ovarian cyst from a young married woman, A. H., whose age was stated to be twenty-seven. The operation was simple, and the only feature of interest was an excessively varicose condition of the pedicle; this gave rise to a little more hæmorrhage than is usual, but was carefully ligatured, and the patient went on uninterruptedly.

On January 27th, 1895, I delivered her of a living *female* child by forceps. On September 19th, 1896, I was called again, but the baby was already born on my arrival; this time it was a male, which is interesting in view of the recent discussion on this subject, as she has only the *right* ovary.

The uterus was firmly contracted, and no trouble was experienced with the placenta, as it came away easily, neither was there any oozing. On palpation there was nothing now to be detected, but I did not feel satisfied, as her pulse was 110 and her aspect anxious. About fifteen minutes after the expulsion of the placenta I felt a swelling on the left, corresponding to the height of the firmly contracted uterus, and strangely simulating a uterus bicornis. Mrs. H. now was

exceedingly restless and complaining of lack of air, while the hæmatoma was undoubtedly increasing, so I sent for Dr. Smyly, to whom I am greatly indebted for his prompt aid. The swelling was now almost as high as the lower border of the ribs in the mammary line, but little over the middle abdominal line. On examination, and taking into consideration the way the patient was holding her own, we thought we were acting wisely in waiting, and so the event proved, as she rapidly improved, and the hæmatoma slowly diminished until below the brim of the pelvis, her highest temperature during the progress of the case was 99·4°. I believe that here we had a rupture of one of the varicose veins mentioned above as seen in the pedicle, and predisposed to this by the softening of pregnancy and the strain of parturition. The other possible condition is an incomplete rupture of the uterus; against this I think may be placed—no pelvic deformity, no prolonged labour, no lacerated cervix, and the pulse though rapid did not display the intermittent character nor the patient the very profound shock usually associated with this condition. I had an opportunity of examining this patient five months after confinement and the hæmatoma had dwindled to the size of a fœtal head, and was distinctly fluctuating. I may mention in this connection a case reported by Tergrigoriantz, in which a broad ligament hæmatoma through pressure-necrosis communicated with the posterior vault, and was emptied of offensive bloody fluid after four months. The future history of my case may possibly therefore be of interest.

Dr. Winifred Dickson said that it seemed difficult to her to imagine how the broad ligament could have become distended so suddenly to allow the tumour to reach up to the ribs. On the other hand, the blood must have been confined, or fatal hæmorrhage would have occurred.

Dr. Purefoy said that such a case was uncommon. The case recalled to his mind another case in which a woman was operated on for an ovarian tumour. About a week afterwards, when the patient was doing well, she unfortunately ate some delicacies brought her by her daughter. Violent vomiting and gastric disturbance followed, and a hæmatocele was produced, owing to the rupture of a vein. Convalescence was delayed but complete recovery ensued.

NOTES ON A CASE OF DOUBLE OVARIOTOMY WITH EIGHTEEN MONTHS INTERVAL BETWEEN THE OPERATIONS.

By E. WINIFRED DICKSON, F.R.C.S.I.;
Gynæcologist to the Richmond Hospital, Dublin.

[Read in the Section of Obstetrics, May 28, 1897.]

I VENTURE to think the brief notes of this case may be interesting in connection with the recent discussion as to the propriety of removing the second ovary, and also in connection with the pathology.

CASE.—Mrs. M. K., aged forty, was admitted to the Whitworth Hospital on the 3rd May, 1895, complaining of distension of the abdomen, and vomiting. She was found to have ascites and, in addition, an abdominal tumour, diagnosed as ovarian, and on the latter account she was transferred to my care at the Richmond Hospital.

Her history was as follows:—Her general health was formerly very good; she had had five children and one miscarriage, the last pregnancy (a full time child) nine years ago. She had not menstruated for the last three months, till about ten days after entering hospital; previously was always regular, the flow being usually slight. She always took a considerable quantity of alcohol. She first noticed the swelling in her abdomen five months previously, but it gave her no inconvenience till the vomiting came on.

On examination, the abdomen was enlarged, and measured in circumference at the umbilicus 106 cm., or 41¾ inches, being slightly more prominent at the left side. Below the umbilicus, and to the left, a resisting mass was felt, globular and fairly movable, but its size and consistency were with difficulty made out owing to the amount of ascitic fluid. There was a trace of albumen in the urine. She was seen in consultation by my colleagues Mr. Thomson, Sir Thornley Stoker, and Mr. Myles, and on account of the amount of ascites it was deemed that the tumour was possibly malignant, but as it was so movable there seemed to

be good prospect that this might not be. On the 23rd May the patient was put under ether and operated on. When I opened the peritoneum a large quantity of ascitic fluid escaped. The tumour came from the left side, and was about the size of a fœtal head and semi-solid. It was drawn out and the pedicle ligatured, but as it was very soft and myxomatous some of the contents escaped during manipulation. The peritoneum looked unusually bright-coloured and injected, but there were no adhesions. The right ovary was of normal size, and apparently healthy. The peritoneal cavity was not douched, but wiped dry with gauze sponges, and the parietes closed with three layers of silk sutures—peritoneal continuous, deep interrupted, and superficial interrupted.

The patient made an aseptic recovery; her temperature on the night of operation was 100·2° F., but after that was always below 100°, and before the operation it had frequently been 100° F., in the evenings. The dressings were not removed till the eighth day, when the stitches were taken out, and the wound found perfectly healed. She was kept in bed, however, for nearly three weeks to insure a firm cicatrix, and was discharged well on the 17th June, after an uninterrupted convalescence. Professor O'Sullivan reported the tumour to be a papillary ovarian cystoma.

The patient was told to report herself from time to time, but this she failed to do, and did not come till eighteen months later, in November, 1896. She then presented herself at my dispensary at the Richmond Hospital in a miserable condition. The abdomen had swelled again to its former size; she was very much emaciated, and was suffering so much from pressure on the lungs that her breathing was very laboured. She stated she had not been able to lie down in bed for some time past. She said she had felt perfectly well till three months before, when she noticed the abdomen again swelling, and it increased rapidly. She menstruated regularly five or six times after leaving hospital, but had not done so during the past year.

On examination, the abdomen was enlarged to the size of a full-term pregnancy and very tense, but the laparotomy scar had not yielded in the least. The circumference of the abdomen was almost exactly the same as it had been a year and a half before, The abdomen was again full of fluid, and there was an uneven nodular tumour, this time at the right side, and movable and not attached to the parietes.

Per vaginam the uterus was drawn up high and pressed to the front, the cervix being closed behind the symphysis. A tense band could be felt at each side, but one did not seem to have more connection with the tumour than the other.

The patient's distress of breathing urgently demanded relief, but as the aspect of the case again strongly suggested malignancy the question of tapping was raised. It seemed, however, that an explanatory laparotomy would add little to the risk, and would afford the opportunity to determine if radical interference was possible.

Accordingly, on November 30th, the patient was put under chloroform, and the abdomen reopened in the line of the original incision, Mr. Harvey assisting me. Anæsthesia was very difficult, as the patient could not lie down, but had to be propped up, almost in a sitting position, on the operation table.

After the peritoneal cavity was opened, and the fluid escaped, she was gradually lowered as the lungs expanded, but oxygen inhalations had to be administered more than once during the operation, as she several times became very cyanosed.

As well as could be measured, there was nearly six quarts of ascitic fluid in the abdomen. The tumour was found to have its origin in the right ovary, and was about the size of a six months' pregnant uterus. Its walls were extremely soft and pliable, and broke down even when seized by the fingers, so that it had to be removed literally in handfuls till about half was taken out, and the half nearer the pedicle, which was of firmer consistence, could be drawn out and the pedicle tied.

The liver was enlarged but not nodular, the omentum somewhat thickened. There were no adhesions nor secondary growths, and the old stump was smooth and healthy. The peritoneal cavity was flushed out with saline solution, and the abdomen closed in the same way as previously.

The patient rallied very well after the operation, but did not make such a good recovery as on the previous occasion. Her pulse kept weak and rapid, so that after a few days she was put on ether and digitalis. The temperature rose in the evening of the third day to 101°, but afterwards fell, and during the next fortnight varied between 98° and 100° F. A stitch abcess unfortunately formed and never entirely healed, owing probably to the patient's low vitality. Ten days after the operation an appreciable amount of fluid had collected again in the abdomen,

and the urine became very scanty, sometimes only 6 ounces being passed, sometimes 16 to 20 ounces, but never more, in spite of diuretic treatment. It contained no albumen. The bowels acted freely; occasionally there was diarrhœa. Ten days later the abdomen had gradually become distended to nearly the size it had been previous to operation; there seemed to be less fluid and more flatulence; there was dullness in the right flank, but not in the left, Some solid irregular masses could be indistinctly felt.

My colleagues kindly saw the patient in consultation with me, and agreed that clinically the case had every aspect of malignancy, and that nothing further could be done. Professor O'Sullivan's report of the tumour, however, was that it was a papillary cyst similar to the former one. The patient became weaker and more emaciated daily, the fluid almost entirely disappeared from the peritoneal cavity, but the irregular nodular masses became more and more distinct, and no one had any doubt but that they were recurrent masses of malignant disease. Patient never complained of pain but gradually sank, and died on the 19th January, 1897, seven weeks after the second operation.

Would it be advisable in a similar case to remove the second ovary even if apparently healthy? I believe that in this individual case it would have been better, but I do not know how one could have foreseen the course of the case.

MR. O'SULLIVAN said that he examined both tumours after their removal and found them to be of the same character, and to be papillary cystic tumours, which appeared to him to be of a benign character. At the *post-mortem* he found an extensive fibrinous peritonitis. Nodules, some solid and some cystic, were found in the peritoneum covering the intestines and in the thickened capsule of the liver. Under the microscope they showed the characters of the original growths. No secondary growths were found except in the peritoneum. He regarded it as a case of peritoneal infection by dissemination of the tumour cells through the abdominal cavity.

DR. A. SMITH said that he had recently operated on a case presenting a similar clinical history to that of Dr. Dickson's. In that case Professor McWeeney had made the diagnosis of malignant adenoma. The tumour did not return. The point of interest in

such cases was the question of the escape of fluid originally into the peritoneal cavity. It is said that in cases of papillomata the escape of fluid contents into the peritoneal cavity is often followed by the grafting of small cells into the peritoneum, these cells subsequently showing a malignant tendency. In Dr. Dickson's case, he thought that she had acted properly in not removing the second ovary at the first operation. The recurrence of the disease in the opposite ovary was rare.

Dr. Purefoy mentioned a case in which a non-malignant ovarian tumour had been removed, followed by normal convalescence for about three weeks, when malignant disease rapidly showed itself in the pelvis, and death occurred. He believed that in Dr. Dickson's case the escape of some fluid into the peritoneal cavity, and the fact of the second ovary showing the same disease as the first, was a mere coincidence. He considered that when the ovary presented an appearance at all healthy it was the proper treatment to leave it.

Dr. Dickson and Mr. O'Sullivan replied.

SECTION OF PATHOLOGY.

DISLOCATION OF THE STERNAL END OF THE CLAVICLE BACKWARDS.

By E. H. BENNETT, M.D.;
Professor of Surgery in the University of Dublin.

[Read in the Section of Pathology, November 6, 1896.]

THE recorded dissections of the dislocation backwards of the sternal end of the clavicle are so few I may claim the attention of the Pathological Section of the Academy while I submit two dissections which I have recently had the opportunity of making of this injury.

To facilitate the description of their details I may be permitted to record, first of all, a case which, though not illustrated by dissection, presents the essential points in relation to this injury when uncomplicated by any fracture; each of my dissected specimens is complicated by fracture.

Early in March, 1890, a young gentleman—a light weight, active and wiry—was riding to hounds when the following accident happened, as described in his own words:—"This is what I recollect—horse going fast at a bank and drop fence, missed his feet on the bank and fell heavily with me. I am nearly sure the point of my shoulder was the first part of me to touch the ground, but the thing happened very quickly. I was not knocked out of time, but mounted at once without assistance, and rode for a couple of fields till I began to feel bad and had to dismount. I afterwards rode seven miles to the railway station. . . . From within twelve months of the fall up to the present the joint has been

as strong as ever. I don't think there is anything else that I can tell you about it except that you made a real good job of me."

I saw him after he arrived at his lodgings, having travelled to town with his horse by train. I found him in great pain, which was seated about the sternal end of the right clavicle, the right side of his neck, and right shoulder. At a glance the backward dislocation of the sternal end of the right clavicle could be appreciated. There was a deep hollow in the position of the usual projection forward and upwards of the sternal end of the bone. In this hollow the finger readily detected the articular facette of the sternum, covered by the skin only; the clavicular portion of the sterno-mastoid muscle was sunken with the clavicle, leaving the sternal tendon unusually prominent. The axis of the clavicle was altered, the point of the shoulder was directed forwards and slightly inwards; the clavicle could be traced to the posterior margin of the facette of the sternum. Any attempt to move the upper limb, or to replace the dislocated clavicle, caused great distress. There was no trouble of respiration. I placed the patient lying down on his bed, in the hope that traction outwards on his shoulder, with backward pressure on the point of the shoulder, would reduce the dislocation easily, as had been my previous experience of the injury. I could produce no effect on the dislocation single-handed, and the attempt at reduction caused such pain that I resolved that an anæsthetic was necessary. As my patient was very weary from his injury, and his ride and railway journey, I thought it best to let him rest until the following morning.

With the assistance of my colleague, Dr. C. B. Ball, and our hospital house-surgeon, I proceeded the next morning before the patient had had any breakfast to reduce the dislocation. When the anæsthesia was profound I attempted the same method as before, making traction of the shoulder

outwards while I pressed the point of the shoulder back against the mattress.

I now had, in addition, the advantage of efficient counter-extension made by Dr. Ball with a sheet passed around the chest at the level of the axilla. Thus arranged our combined action had no effect on the dislocation. Luckily in the room was a copy of the British Statutes (my patient is a barrister), a book nearly cubical in shape, and at least a foot thick. I placed this between his shoulders, and getting on to the bed I put my right knee on the front of the shoulder, keeping up the extension outward. Suddenly the clavicle sprang out with a loud snap from behind the sternum, and the dislocation appeared to be completely reduced. The moment I relaxed the extension it recurred, but only as an incomplete dislocation, which light pressure backwards on the shoulder reduced; on relaxation it again recurred. To check this partial recurrence I placed my patient sitting in bed supported by a bed-rest, the shoulders held back by a figure of eight bandage, and I slung over the point of the shoulder a long sand-bag such as we commonly use in treatment of fractures of the leg. In this way the bone retained its normal position, and after a few days, to let the patient move about, I substituted a strong elastic webbing bandage drawn obliquely over the point of the shoulder, and fixed behind and to the opposite side of the waist to a hunting belt which I found ready to my hand in the patient's room. This belt, broad and well padded, remained fixed round the waist, and did not twist round with the strain of the elastic band.

This case establishes four important points with regard to backward dislocation of the sternal end of the clavicle—first, that there are two varieties of the dislocation as recognised by Pellieux[a]—superficial or incomplete, and deep or complete; secondly, that the dislocation can occur without fracture of

[a] Pellieux. Revue Medicale. 1884.

FIG. 1

FIG. 2

FIG. 3

FIG. 4

BACKWARD DISLOCATIONS OF THE STERNAL END OF THE CLAVICLE

the clavicle or of the first rib; thirdly, that it can be produced by indirect force taking effect on the point of the shoulder; and fourthly, that it can be treated without any partial displacement persisting, or tendency to recurrence after a brief and simple treatment.

I now come to the dissections. Thrown on the screen the photographs exhibit their details very completely. This first specimen, an account of which I have already published in 1880, is the first recorded dissection of the backward dislocation:—

"The clavicle has gone back directly towards the thoracic cavity. The first rib has, so to say, left a small piece attached to the sternum, and so, though it looks like a dislocation, it is a fracture of the cartilage of the first rib at its junction with the sternum, and not a dislocation. In the clavicular dislocation we find, on turning back the muscles, that the transverse ligament between the two clavicles is still present, though strained and somewhat ruptured. The fibres passing over the anterior aspect of the sterno-clavicular joint are ruptured at their attachment to the sternum, or are torn clean away from it, and the superior ligaments, though not torn away, are lacerated very considerably. The inter-articular cartilage is detached absolutely from its sternal connection, and it and the clavicle and outer joint between the cartilage and the clavicle have gone completely backwards to the thorax—that is, the lesion has passed through the joint next to the sternum."[b]

This injury was the result of direct force applied against the inner end of the clavicle.

Figs. 1 and 2 represent the front and posterior views of the dissection respectively.

The next specimen is an example of complete dislocation

[b] Proceedings of the Pathological Society of Dublin. N. S. Vol. IX., p. 68. Dub. Q. Journ. of Med. Science. Vol. LXXI., p. 444. 1881.

of the sternal end of the clavicle backwards, with an united transverse fracture of the sternal end of the clavicle passing through the attachment of the rhomboid ligament.

Figs. 3 and 4 present the anterior and posterior views respectively of the dissection. Fig. 5 shows the relations of the parts as exposed by a horizontal section through the dislocated clavicle and the manubrium sterni.

The sterno-clavicular joint is represented by only a very small synovial cavity on the anterior aspect of a fibrous mass connecting the end of the bone to the sternal articular surface. Unfortunately the nature of the lesion was not recognised by those that dissected the body until the dissection had been carried so far as to remove the opposite bone and outer portion of the clavicle on the injured side also, so we have not the opportunity of comparing the two sterno-clavicular joints as we have in the next specimen.

Figs. 6 and 7 give the anterior and posterior views of this specimen; Fig. 8 the view of the horizontal section through the specimen.

The clavicles, manubrium sterni, and first rib are from a subject dissected in the School of Physic this winter (1896–7). The right clavicle has been broken and united; the fracture was oblique, and ran through the attachment of the rhomboid ligament from behind and without forwards and inwards. The sternal extremity of the bone is dislocated backwards incompletely, the sterno-clavicular is reduced to a single synovial cavity, apparently by rupture of the ligaments, particularly the miniscus.

These specimens present the backward dislocation of the sternal end of the clavicle in its two varieties—superficial or incomplete, and deep or complete—the two positions assumed by the bone in the case I have recorded at the commencement of this note.

The examples associated with united fracture of the sternal

FIG. 8

FIG. 7

FIG 6

FIG. 5

BACKWARD DISLOCATIONS OF THE STERNAL END OF THE CLAVICLE

end of the clavicle would make it probable that the dislocations were caused by different causes—direct violence in the case of the transverse fracture; indirect—such as a fall on the point of the shoulder—in the case of the oblique fracture.

Prof. Nixon observed that an interesting feature in the hunting accident case was that there was no difficulty of respiration. In these dislocations there was very often great pressure on the trachea and sometimes on the laryngeal nerves, producing recurrent spasms of so extreme a character that resection of the sternal end of the clavicle had been recommended for their relief. As to the cause of the fracture, it appeared to him that the rider must have rotated as he came down and fallen, not on the point of his shoulder, but on the back of it. Did Prof. Bennett ascertain what was the position of the sternal end of the clavicle with respect to the trachea?

Mr. Lentaigne said that, as to dislocation backwards, he remembered having seen one case, when he was a very young man, in which all efforts at reduction failed; the man went from hospital to hospital, and the dislocation remained unreduced. In that case there was no laryngeal or respiratory trouble of any kind, but a marked hollow could be seen.

Mr. Jameson Johnston asked did Prof. Bennett include the fracture of the first rib in one of the specimens as part of the result of the original accident? Might not the fracture of the rib have been caused by the bending of the clavicle over it?

Prof. Bennett (in reply) said that in more than half of the cases of this kind of fracture that were recorded in the books there was no mention of respiratory distress. In some cases it was present in a greater or lesser degree. In a case treated by Sir Astley Cooper it was a paramount symptom, and the persistent pressure of the unreduced dislocation required the removal of the sternal end of the bone; but that was the only case in which its removal was ever performed. As to the fracture of the first rib, it was impossible to doubt, from the appearance of the specimen, that it must have been produced by the same force that caused the dislocation—namely, direct pressure backwards on the sternal end of the clavicle, which carried the cartilage of the first rib with it. The man was squeezed against some projecting piece of brick. In many recorded cases the shaft of a cart striking a man had produced a dislocation of the kind in question; and in some of these a fracture of the first rib was recorded also.

ACUTE SEPTICO-PYÆMIA.

By M. A. BOYD, M.D.;
Physician, Mater Misericordiæ Hospital, Dublin.

[Read in the Section of Pathology, November 26, 1896.]

Case.—A young man, aged twenty-three, a cattle-drover, of intemperate habits, got ill with a rigor, pains in his limbs and back on the 23rd of last November, having got a severe wetting two days previously. He continued ill in bed until the 27th, when he was seen by a medical man, who ordered him to hospital, and he was received into the Mater Misericordiæ Hospital on the same day. He had then a temperature of 104°, complained still of headache, with sickness and pains all over him, some slight diarrhœa, pale in colour, and was from time to time delirious. There was no distension of the abdomen, and the tongue, though coated, was not characteristic of typhoid. He had more the dusky aspect of an early case of typhus, and the first sound of his heart was exceedingly weak and soft, but there was no murmur. He also showed some petechial spots on his trunk and thighs. There was some cough, but no evidences of pneumonia, and his urine was high-coloured and scanty, but did not contain albumen. He continued delirious, and died the following morning from apparent failure of his heart and congestion of his lungs.

The autopsy revealed the following conditions:—Extreme *post-mortem* lividity over surface of body; marked fluidity of the blood; a small amount of blood-stained serum in the pericardium, but no pericarditis, and no softening of the heart muscle; there was marked hypostatic congestion of the bases of both lungs, but no consolidation of them. On opening the cavities of the heart the endocardium showed numerous purpuric-looking hæmorrhagic spots scattered over it, principally in the neighbourhood of the fleshy columns in both ventricles. On the free edges of the mitral valves there was also what looked like very recent deposit of lymph, forming a delicate fringe, but the valves were not thickened or adherent in any way. The liver was enlarged, and showed the congestion of alcoholism, but presented no other special features.

The kidneys were enlarged and very vascular, with their capsules adhering, but not intimately; beneath the capsules the same hæmorrhagic or purpuric-looking spots were visible scattered over the entire surface of the cortex, and similar to the spots on the endocardium just described. Section of the kidneys showed these spots distributed through the substance of the cortex and between the pyramids, but there was no hæmorrhage into the pelvis of either kidney. The intestinal tract showed no trace of disease. The spleen was enlarged and almost diffluent, with no granules visible on section.

I am indebted to Dr. McWeeney for throwing light on the nature of these purpuric-looking spots in myocardium and kidney. He carefully removed the central contents of some of the largest from both kidney and heart, examined them under the microscope, and found them to consist of aggregations of micrococci, surrounded by minute quantities of pus in an early process of formation. The fine, fringe-like lymphy exudation on the mitral valves were entirely composed of branching growths of micrococci, with inflammatory exudation just beginning on the endocardium. Both the stained preparations he has placed on the slides under the microscope, and the very beautiful cultivations he has grown on nutrient gelatine shows the micrococcus to be the staphylococcus pyogenous aureus. He also exhibits on one of the slides a capillary vessel, plugged with micrococci, showing the channel by which the micro-organisms were distributed through the body to have been the blood.

The features of interest in the case from the clinical point of view were the acute onset of the symptoms, and their similarity to a case of typhus in an early stage before the appearance of rash. The rapid course of the pyo-septicæmia, terminating in death on the fourth day from the onset of symptoms; the failure of the heart without any murmur being present to indicate the condition of the mitral valves, and without any evidences of softening of the muscle at the

post-mortem examination, though clinically the character of the first sound indicated such a condition. From the pathological point of view the specimens are of extreme interest as showing the formation of a septic endocarditis in its earliest stage, the distribution of the micrococci by the blood-stream leading to septic infarcts in myocardium and kidney, and the absence of any assignable source from which the pyogenic micro-organisms could have produced their invasion.

The sources we are taught to look to in the teachings of pathology for such invasions are traumatisms on the surface of the body, accompanied by suppuration, or abscesses, or ulcerations in connection with mucous membranes, or occurring in internal organs as the result of disease. No such source existed in this case as far as a most careful *post-mortem* examination could reveal it, and we are bound to assume that many of the micro-organisms normally found in the mouth, pharynx, stomach or intestines of healthy individuals, may not alone find entrance to the blood from an abraded surface, but even when the vital resistance of the tissues against invasion is weakened by shock or depressing influences, they may also do so. Exposure to wet and cold would seem to produce a condition of lowered vitality favourable to such an invasion, or a combination of alcoholism and exposure, such as in this boy's case, would seem to have produced such a lessened resistance to their invasion that organisms, under other circumstances inert, may become actively aggressive and invade the blood. Such invasion may take place through a gastro-intestinal tract deranged from alcoholism or other causes. We also know that many microbes heretofore considered saprophytes, when they change their environment become actively pyogenic—the Diplococcus of pneumonia for instance, and the Bacillus coli communis. A possible source of invasion in this boy's case may have been through

his liver or stomach, both deranged from alcohol, or through an abrasion on the mucous membrane of the latter from some small linear ulcer, frequently present in the stomach of drunkards.

Dr. E. J. McWeeney looked upon the case as of considerable interest as indicating a morbid condition extremely liable to be overlooked at an examination not of a very careful character. The miliary abscesses in the kidney were very small, and the condition of the mitral valve was also invisible to the naked eye, but the grave condition was revealed under the microscope. One of the microscopical sections showed the whole of the central portion of one of the little abscesses in the kidney taken up by a zooglœa mass of micrococci. Another section showed the myocardium close to the point of attachment of the mitral valve, and it could be seen that the spaces, normally occupied by capillaries, were plugged with masses of micrococci. From a cultivation the Staphylococcus aureus had been obtained, and a plate cultivation showed the liquefying power of the organism upon gelatine. The organism produced a pale, washy, yellow colour. The organisms had been evidently circulating in the blood of the patient.

Sir C. Nixon said that probably everyone was familiar with cases of rheumatic fever undergoing a very bad course where there had been a preceding heart affection. After death the heart, in such cases, presented the ordinary appearance of malignant endocarditis, and the condition seemed to be secondary to a pre-existing organic disease. On the other hand, malignant endocarditis was sometimes found as a primary condition. Some writers said that micrococci, similar in character to those which had been found in malignant endocarditis, were found in all forms of endocarditis. An analogy, he thought, might be drawn between cases of malignant endocarditis and cases of acute tuberculosis, in both of which diseases acute primary forms were sometimes found, or acute forms were sometimes grafted on to chronic ones.

Dr. Parsons said that most cases of malignant endocarditis which had come under his notice had had their origin in disease of the middle ear, the septic material having made its way into the carotid artery or the jugular vein.

Dr. Boyd (in reply) said that there was no real indication as to the nature of the case. The symptoms had been those of typhus fever to a great extent, and not till *post-mortem* examination did the nature of the case dawn upon him. There had been no disease of the middle ear, and no indication at all in any organ of a primary seat of disease.

ON TWO CASES OF PSEUDO-MEMBRANOUS ENTERITIS, WITH REMARKS ON THIS AFFECTION.

By W. FRAZER, F.R.C.S.I., M.R.I.A.

[Read in the Pathological Section, March 26, 1897.]

THE occurrence of pseudo-membranous enteritis in Ireland is rare, so far as my experience extends; it is needless to refer to the numerous synonyms under which it is described in medical works, which are easily referred to. I attended, several years since, two well-marked and severe cases. One was that of a young medical practitioner, who was impressed with the conviction that his disease and its symptoms were due to tape-worm, and therefore submitted the pieces discharged for identification. The attacks used to last for some time, recurring at intervals and causing much suffering, I fear aggravated by the use of cathartic medicines. Altogether the course of the affection continued for several months. The other patient was a gentleman who suffered at irregular intervals for four or five years. The attacks appeared to be induced by injudicious exposure to atmospheric chills, overfatigue, or travelling and irregularities of diet. They gradually ceased, and he still lives apparently in good health in every respect. Lately I saw two more patients, complaining of this troublesome and painful malady. One of these had a slight attack, marked by the passage of small pieces of membranous shreds and fragments; these did not exceed an inch or so in length, and were accompanied by the usual symptoms of recurrent sharp abdominal pains and gripings, with tenderness over the transverse and descending colons, the bowels acting irregularly. On examination

microscopically the exudations were found to be structureless, apparently allied in composition to mucin. The second patient's symptoms were severe and persistent, masses of the secretion continuing to form for several weeks, more abundant at intervals of a few days, when they came away in quantity, often assuming tubular forms and reaching four to six inches in length. The accompanying symptoms were correspondingly aggravated and distressing—the urine contained an excess of phosphates, and some uterine irregularity was present, but this had existed long before the development of the enteric affection, and could not be fairly connected with it. The microscopic appearances were similar in both cases—structureless membrane studded with numerous irregular granular cells, quite devoid of any confervoid growth. In the latter patient there was present at the same time a well-marked affection of the naso-pharyngeal mucous membrane, which was red, dry, and glazed; it secreted for some weeks adhesive tenacious masses of apparently similar material. It is to the coincidence of this affection I desire specially to refer, for it appears to illustrate the nature of the abdominal attacks. It seems to me we have present in the naso-pharyngeal attack such as I describe, accompanied by a pseudo-membranous exudation, a close representation of what occurs in the formation of those more obscure exudations that develop within the interior of the intestines.

I would briefly refer to another case of this disease which I examined for the late Sir Dominick Corrigan. It was that of a physician residing in the south of Ireland, who thought he had obstruction or intussusception of the bowels, followed by sloughing of a portion of the intestine. After some days of constipation, with local pain and suffering, a large thickish mass of tubular form was discharged, twisted on itself, about six inches in length, of dirty greyish colour. It was devoid of all gangrenous odour, and the microscope showed its

structureless nature and absence of all muscular elements, although it was remarkably firm, and presented to the sight a rough appearance of fibrous arrangement externally. So far as I know there was no recurrence of the attack. This gentleman died some years after from a rare affection—acute suppression of urine.

PATHOLOGICAL CONDITIONS OF THE HEART AND AORTA.

By JAMES B. COLEMAN, M.B., L.R.C.P.I.;
Physician to the Richmond, Whitworth, and Hardwicke Hospitals, and to the Children's Hospital, Dublin.

[Read in the Section of Pathology, January 15, 1897.]

THE ten specimens of hearts which I bring before the Academy this evening have been selected from cases which came under my notice in hospital for the past five years, and some of them illustrate pathological conditions which are of sufficient rarity to be of interest. Two of them are taken from children with chorea and endocarditis; one from a case of rheumatic endo-pericarditis in a child. One case shows an extreme degree of mitral stenosis; another illustrates aortic valve disease; there are two specimens of aortic aneurysms, and one of extreme calcification of the arch of the aorta; and the last two specimens show (*a*) rupture and (*b*) aneurysm of the heart. Of the five last cases I have no clinical notes, as they occurred in patients who died suddenly, and were dead on admission to hospital.

(1.) *Endocarditis*; *Chorea.*—The first heart which I show is from a girl, aged eleven years, who was admitted to Jervis-street Hospital under my care on 4th January, 1894, suffering from chorea gravis. The onset of the disease was attributed to a fright, a dog having attacked the child ten days before. Her brother had rheumatic fever. On admission she had incessant violent choreic movements, which interfered with sleeping and eating. She was much wasted, and she had an organic mitral systolic murmur. Arsenic, chloral, and bromides were ineffectual in checking the movements, and chloroform sparingly administered had only a transient

beneficial effect. She died of exhaustion on the eleventh day after admission, and on the fifteenth day of the disease. The heart shows recent vegetations on the auricular surface of the mitral valve.

(2.) *Endocarditis; Chorea.*—The second case is that of a boy, aged eight years, who was admitted to the Children's Hospital on 26th November, 1896, with moderately severe chorea. He had old-standing mitral regurgitation, with considerable hypertrophy of left ventricle. His sister has mitral regurgitation (following rheumatic fever), an uncle is epileptic, and an aunt insane. His condition improved until 15th December, when his temperature, hitherto normal, ran up to 103° F., and he suffered from diarrhœa and vomiting. Next day his pulse was 160, temperature 102·4°, and respiration 64. He evidently had a fresh attack of endocarditis, from which he died on 19th December. His heart, which I exhibit, is much enlarged for a child of eight years, particularly the left side. The mitral orifice admits two fingers readily, and shows recent vegetations, whilst *the apex is bifurcated*, the apex of the left ventricle being more than one centimetre below that of the right, and separated from it by a groove.

(3.) *Endo-pericarditis* (*Rheumatic*).—The third case is from a boy, aged four years, who was admitted to the Children's Hospital on 14th November last in a semi-comatose condition. He was in good health until four days previously, when he complained of pains in his joints, and suffered from vomiting and convulsions. On admission his temperature was 105°, pulse 144, respirations 60 and laboured, face cyanosed, sweating profusely. Both knees and the right elbow-joint were tender. Loud râles and rhonchi all over thorax rendered auscultation of his heart almost impossible, except during the respiratory pause accompanying the act of swallowing, when a pericardial friction-sound was heard. He died in two days.

The heart is not enlarged; both visceral and parietal layers of pericardium are covered with soft, shaggy, easily detachable, lymph, and there is some cohesion of and vegetations on cusps of mitral valve.

(4.) *Mitral Stenosis.*—The next case is one of extreme mitral stenosis in a girl, aged nineteen, who was under my care in the Whitworth Hospital. She had suffered from paroxysms of palpitation, dyspnœa, cough, and hæmoptysis at intervals for the last two years. She never had rheumatism. She presented typical signs of mitral stenosis—viz., presystolic thrill over mitral area, long, rough, presystolic murmur terminated by a sharp first sound, with scarcely audible second sound at apex, whilst at the base of the heart the pulmonary second sound was much accentuated—sometimes doubled—and the aortic second sound was very weak. She died suddenly. At the autopsy hæmorrhagic infarcts were found in the lower lobe of each lung. The heart shows extreme stenosis of the mitral orifice, which is funnel-shaped, the apex of the funnel protruding into the ventricle. The communication between auricle and ventricle is reduced to a slit, which would only admit the edge of a threepenny bit. The left auricle is much hypertrophied, left ventricle about normal size, right ventricle hypertrophied, and right auricle dilated.

(5.) *Aortic Valve Disease.*—The fifth specimen is from a man, aged fifty-six, a labourer, who died of phthisis. He had the usual physical signs of aortic stenosis and patency. His heart shows dilatation and hypertrophy of the left ventricle, and the aortic valves are represented by sclerotic masses and calcareous nodules.

(6.) *Small Sacculated Aneurysm of Aorta.*—The sixth specimen is taken from a man, aged fifty-five, who was dead on admission to hospital. The pericardium was distended with blood, which came from the rupture of a small sacculated

aneurysm situated below the junction of the ascending and transverse parts of the arch of the aorta on the anterior aspect. The aneurysm is seen to be a localised pouching-out of the aortic walls, no larger than half a cherry.

(7.) *Aneurysmal Dilatation of Arch of Aorta.*—The next specimen is from a man, aged sixty, who dropped dead in the street. It shows general aneurysmal dilatation of the arch of the aorta, with sclerosis of the aortic valves.

(8.) *Calcification of Arch of Aorta.*—The eighth specimen is one of extreme atheroma of the arch of the aorta. It occurred in a man, aged sixty-three, who was stated to have suffered from attacks of an anginal character. The police found him on a doorstep almost unconscious, and he was dead on admission to hospital. The entire inner surface of the aortic arch is seen to be lined with thin calcareous plates varying in diameter from a quarter of an inch to an inch. Some of them are attached to the aorta by one edge, the rest of the mass floating free in the lumen of the vessel. The coronary arteries can be felt to be of stony hardness, and the muscular coat of the heart shows fatty degeneration.

(9.) *Rupture of Heart.*—Another specimen is from a man, aged sixty-six, who was dead on admission to hospital. The pericardium was distended with blood. The heart shows a rupture near the apex of the left ventricle. On the pericardial surface of the organ there is a rent about half an inch in length, and on the corresponding endocardial surface there is ulcerative destruction, involving the endocardium and subjacent strata of muscular tissue. Some of the branches of the coronary artery are affected with endarteritis obliterans, and the cardiac muscle has undergone considerable fatty degeneration.

(10.) *Aneurysm of Heart.*—The last specimen was obtained from a labourer, aged twenty-eight, who, whilst engaged in severe work on the quays, dropped dead. The men who

brought him to hospital stated that previously he had made no complaint. The pericardium was distended with blood, and the cause of death was a ruptured aneurysm of the left ventricle somewhat bigger than a walnut, and situated near the apex of the ventricle. The external wall of the aneurysm is seen to be composed of pouched-out pericardium, the cavity invaded the thickened myocardium, and a small opening from the ventricle near the apex led into the sac of the aneurysm. Microscopic examination revealed fibroid myocarditis.

Remarks.—Sudden death occurred in six of the cases above described—in case 4, mitral stenosis; 6, aneurysm of aorta; 7, do.; 8, calcification of aorta; 9, rupture; and 10, aneurysm of heart.

At the autopsy the pericardium was found distended with blood in three cases—aneurysm of aorta, rupture of heart, and aneurysm of heart.

It is worthy of note that among the above ten fatal cases of heart disease there is only one—that of a boy aged four years—in which the ætiological influence of rheumatism was apparent.

In reference to the two fatal cases of chorea, I may mention that they occurred among a total number of 91 cases treated by me in hospital. It will be noted that both had endocarditis, thus further exemplifying the almost invariable association of cardiac lesions with fatal cases of chorea.

Dr. Bennett remarked that these cases of spontaneous rupture of the heart accorded with the opinion expressed by Dr. Stokes in former days, that when spontaneous rupture of the heart occurred it took place at the apex of the left ventricle.

Dr. Fraser said two points deserving of elucidation arose in these last-mentioned cases. One was as to the cause of the aneurysmal dilatation—why it should occur in the strong muscular covering of the heart. Was it the result of ulceration, or of

degeneration of the tissue, or of an abscess? It had been noticed that when blood escaped slowly from small aneurysmal rents, the action of the heart continued, the result being an accumulation of blood and slowly-occurring death of the subject. Professor Haughton had given an account of a case of that kind of slow death resulting from blood coagulated round the heart. As to the bifurcated heart, it must be looked on as a case of congenital malformation.

Dr. Symes asked whether any great dilatation of the heart, without valvular disease, was observed in the cases of the children who died of chorea. Dilatation of the heart pure and simple was one of the commonest affections of children. It was said that chorea was created by rheumatic poison; and there was no doubt that the heart did dilate enormously in such diseases in young children. He had seen hearts of young children in which he would have pronounced the mitral valve to be diseased, but more experienced men had told him that the appearances were healthy.

Dr. McWeeney said he had examined a large number of hearts, but had never seen anything like the heart with the double apex which had been exhibited. Occasionally a slight depression between the right and the left sides of the apex was met with; but a left apex fully an inch below one on the right side, with a deep groove running between them, was a matter of considerable rarity.

Dr. Bennett said he had never seen a bifurcated heart like the one exhibited.

Mr. F. A. Nixon said a good many of these pathological conditions of the heart were due to some form of strain happening to men who pursued laborious occupations, and to soldiers and sailors. The late Sir William Aitkin put forward the theory that such strains or injuries resulted in some form of inflammation. Patients who were brought dead to his hospital were nearly always men who had been employed in lifting heavy weights, such as corn and quay porters. The specimen of cardiac aneurysm now shown was a rarity.

Dr. Coleman (in reply) said that in cases of chorea in children he had noticed dilatation of the heart, but not very commonly. There was no doubt as to there being vegetation of the valves in the hearts he had shown as exhibiting that feature, although it was more distinctly visible when the specimens were fresh, for there was then obvious inflammation of the valves.

A CASE OF LOCOMOTOR ATAXY.

By JAMES B. COLEMAN, M.B., L.R.C.P.I.;
Physician to the Richmond, Whitworth, and Hardwicke Hospitals, and to the Children's Hospital, Dublin.

AND

A. C. O'SULLIVAN, M.B.;
Pathologist to the Richmond, Whitworth, and Hardwicke Hospitals; Lecturer on Pathology, Trinity College, Dublin.

[Read in the Section of Pathology, March 26, 1897.]

DR. J. B. COLEMAN read the notes of a case of locomotor ataxy, which was under his care in the Whitworth Hospital. He said that the interest in the case depended on the fact that, whilst the symptoms were carefully observed during life, there was an opportunity of making an exhaustive examination of the spinal cord, the patient having died of intercurrent disease. The clinical history was as follows :—

J. B., aged forty-one years, married, a book-keeper by occupation, was admitted to hospital on 11th November, 1896, complaining of great weakness, pains in his legs, and shortness of breath. For years he had suffered from constant exposure to cold and wet, and he was in the habit of leaving his wet clothes on. He never had syphilis, but he had three attacks of gonorrhœa. He had rheumatic fever and variola in 1872; he never drank to excess. He is married, and has three healthy children, the youngest being only twelve months old; his wife never aborted. He had to give up his work fifteen months ago on account of debility.

About two and a half years ago he was first attacked by severe shooting pains in his legs; those pains sometimes recurred several times in the twenty-four hours; sometimes they were absent for a week or ten days. Two years ago he noticed that he took a long time to pass his water, and a little later he had occasional incontinence of urine. At about the same date he became conscious of feeling "unsteady on his legs," and six months later he used to

stumble greatly in the dark. Occasionally during the last two years he used to see objects double. Eighteen months ago he felt his left arm numb, and when he touched an object it seemed as if he touched two or three. Within the last six months he has suffered from a feeling of constriction around the waist, and from tenesmus.

Condition on admission to hospital.—Patient is very thin; skin is dry and rough; temperature normal. Superficial area of cardiac dulness is increased, and he has an aortic systolic murmur; there is extensive tuberculo-fibroid disease of both lungs. With regard to his nervous system, his gait is slightly ataxic; in walking he keeps his legs widely apart, and there is irregular contraction of the tendons on the dorsum of his feet. When he stands with feet together and eyes closed he sways and would fall if unsupported (Romberg's sign). There is incoordination of the movements of his arms, inability to estimate gross difference in weight, and loss of sense of posture. The knee-jerks, the plantar, cremasteric and abdominal reflexes are absent. His pupils are contracted; the Argyll-Robertson phenomenon is present, and there is loss of reflex dilatation of the pupil from painful stimulation of the skin of the neck (lost cilio-spinal reflex). He has feeble muscular power in his legs, and he is unable to walk more than half a mile without feeling tired. Anæsthesia is markedly present in left hand over area of distribution of ulnar nerve, and to a less extent in the same position in the right hand. In both legs and in left arm there is delay in transmission of painful sensations, and the sense of heat and cold is deficient in the same areas. Trophic changes are evident in the toe-nails and in the skin of the soles, the latter being thickened and fissured.

The patient died of disseminated pulmonary tuberculosis on 15th December—five weeks after admission to hospital, and about two years and a half since the earliest symptoms of locomotor ataxy ("lightning pains") appeared.

The lesions found *post mortem* will be described by Mr. O'Sullivan, who made the autopsy.

Mr. O'Sullivan said that the *post-mortem* examination showed thickening and sclerosis of the aortic valves; cavities, fibroid changes, and bronchiectasis in the right lung and disseminated tubercles in the left. On microscopic examination the nerves of

the cauda equina showed increase of endoneurium and marked thickening of the inner coats of the arteries. The cord showed degeneration of the posterior columns, which could be traced from the lower coccygeal region, where the cord was two millimetres in diameter, to the medulla oblongata. The ventral field of the posterior columns was free from degeneration throughout. A narrow zone running along the median septum was free in the lower part of the cord. In the dorsal region the medullated fibres of Clark's column had entirely disappeared. The posterior roots outside the cord were markedly degenerated up to about the 5th dorsal segment; from this on to the 2nd dorsal segment they were almost free, and the path of these undegenerated fibres in the cord formed a narrow strip which could be traced along the outer margin of Goll's column to the medulla, where they ended in the nucleus cuneatus. Above the 2nd dorsal segment the degeneration of the posterior roots recurred, and was most marked in the cervical enlargement. Their path in the cord was marked by a strip of degeneration lying outside the last-mentioned and also passing to the nucleus cuneatus. Above the cervical enlargement the degeneration of the incoming roots suddenly ceased. The degeneration was most marked all through on the left side. Two of the spinal ganglia which were examined showed proliferation of the layer of cells lining the spaces occupied by the ganglion cells.

Dr. M. A. Boyd asked if the peripheral nerves had been examined in the case. Any interference with the peripheral nerves would account, to a great extent, for the symptoms in locomotor ataxy.

Dr. McWreney asked if Mr. O'Sullivan had examined the posterior roots by Marchi's method. Professor Leyden had lately stated that Weigert's method was incapable of showing a relatively slight amount of degeneration in the posterior nerve roots, but that Marchi's method would show it. Professor Leyden had described certain large round cells as occasionally to be seen surrounding the ganglion cells, and he had also described the same kind of cells, which were known as Leyden's cells, surrounding the trophic cells in the anterior horn in cases of infantile paralysis. Did Mr. O'Sullivan utilise Pal's method in studying the changes in the ganglion cells?

Sir C. Nixon asked if Mr. O'Sullivan considered the condition of the blood vessels in the lower part of the cord a primary or a secondary effect of the lesion.

Mr. O'Sullivan (in reply) said, in answer to Dr. Boyd, that the peripheral sensory nerves had not been examined. With reference to Dr. McWeeney's questions, he said that in fresh degenerations, when the myeline was altered but not absorbed, Marchi's method was useful. In the case of chronic processes with sclerosis, that method was less and less useful, but he had the very strongest opinion of the usefulness of Marchi's method in almost all forms of degeneration. It was true that degenerations which were invisible by Weigert's method, showed well by Marchi's. He did not think that the cells which he had seen could have been what Dr. McWeeney said were described by Leyden, as they were cells which were normally present in the ganglia, but in this case had increased in number. As regards the study of ganglion cells in general, he used Nissl's method. With reference to Sir C. Nixon's remarks, he (Mr. O'Sullivan) said he was of opinion that both the lesions of the blood vessels and nerves had the same cause.

SOME APPLICATIONS OF THE "X-RAYS" IN DIAGNOSIS; ILLUSTRATED BY LANTERN SLIDES, SKIAGRAPHS, AND THE FLUORESCENT SCREEN.

By WILLIAM S. HAUGHTON, M.B.;
Assistant-Surgeon to Sir Patrick Dun's Hospital, and Demonstrator of Anatomy, T.C.D.

[Read in the Section of Pathology, May 7, 1897.]

It is with very great diffidence that I bring forward my communication before the members of the Academy this evening, as I feel sure you are all fully aware of what Röntgen photography has done up to the present, and its possibilities in the future, when applied for purposes of diagnosis in medicine and surgery. I shall, therefore, confine my remarks more particularly to those cases which have come under my own notice, and to the experience which I have gained in observing them.

After a study and practice of the application of "X-rays" in medicine and surgery during the past fourteen months, it appears to me that for convenience of description we may best divide those cases in which the process is applicable into three classes:—

I. Those cases in which the information obtained is *certain* and *complete.*

II. Those cases in which *some information is always obtained*, but it is not always complete.

III. Those cases in which *some information may be obtained*, but it is seldom complete.

Firstly, those cases in which the information obtained is certain and complete. In this class we may place—

(a.) *Fractures.*

(b.) *Dislocations.*

(c.) *The fracture peculiar to early life, commonly known as Epiphysiary Fracture or Separation.*

(d.) *The Location of Foreign Bodies.*—In the trunk, limbs, neck, and certain parts of the head, provided the foreign body consist of any of the *metals* (aluminium being excepted), *glass*, *china*, and some other substances.

Secondly, those cases in which some information is always obtained, but it is not always complete. In this class we have—

1. *Diseases of Bone*:—

(*a.*) Rarefaction or Condensation of bone from any cause—*e.g.*, necrosis or periostitis.

(*b.*) Tubercular disease of bone.

2. *Tumours of Bone*:—

(*a.*) Osteomata.

(*b.*) Enchondromata (particularly if ossifying).

(*c.*) Sarcomata.

In the Third Class—those cases in which some information may be obtained, but it is seldom complete—we must include the skiagraphy of the trunk (with the exception of *foreign bodies*, as mentioned in the *first class*).

A skiagraph taken through the trunk, to locate a renal or vesical calculus; fracture, dislocation or disease of the vertebræ; to demonstrate the size or shape of the heart or liver, or a mediastinal tumour, yields a result which, up to the present time, is at best rather obscure. Still some useful observations have been made, and there seems little doubt that with progressive improvement in the apparatus—particularly of the "tubes"—much better results will in time be obtained.

With regard to my first class, it may be objected that the

information is not always *complete*. Now if we except the hip-joint and its neighbourhood—which is very opaque to "X-rays" owing to the great mass of muscles surrounding it—I think that the results obtained should always be complete, provided a good apparatus is used, in experienced hands, and with due precautions.

The case of a foreign body, say a needle in the foot, will serve as an illustration. Much discredit has often been thrown on the process, because after a skiagraph has been taken, showing the position of the needle clearly, the operation which followed has failed to discover the needle. This failure is usually due to one of two causes—either that the needle has moved during the interval between the skiagraphing and the operation, or else that the skiagraph was not taken intelligently. The first cause of failure can be easily remedied by using the fluorescent screen immediately before operation; this of course often requires a portable apparatus. The second can be readily overcome by taking two skiagraphs in planes at right angles to one another.

To take a skiagraph intelligently requires some common sense, but it also requires an accurate knowledge of osteology and the anatomy of joints.

To return to the "missing needle." In order to locate a point in space accurately we must have measurements in the three dimensions in space—length, breadth, and depth. Now the skiagraph of the needle in the foot, taken from above the foot, shows accurately the relations of the needle with regard to the length and breadth of the foot; but we know very little of the precise depth of the needle, and so the all-important question to the operator as to whether his incision is to be on the dorsal or plantar aspect is still unanswered. Hence the failures.

The simple expedient of taking a second skiagraph at right angles to the first will, of course, reveal the depth of

the needle, and show whether it is placed nearer to the dorsal or plantar aspect. This method applies to all parts of the body in dealing with opaque foreign bodies. I may here state, that I believe the screen is much preferable to photography for the location of foreign bodies.

What has been said about "taking" a skiagraph applies equally to the intelligent "interpretation" of one, with this addition—for accurate interpretation one must have considerable experience in skiagraphical results.

It has been stated that the application of "X-rays" is limited to a very narrow field in surgery; but if we consider what a large proportion of everyday surgical practice is composed of fractures, dislocations, obscure epiphysiary fractures, tubercular disease of bone, and foreign bodies, I think it may be fairly claimed that the field of its usefulness is not so limited as it may at first sight appear.

With regard to the dermatitis sometimes following exposure to "X-rays," it is of interest to note the very small number of cases recorded out of the thousands experimented on. Of course this may arise from a very natural reticence on the subject. But still, if it were of frequent occurrence we should hear more of it. As far as we can judge, it appears only to follow very protracted exposures (an hour or more), or very frequently repeated short exposures, such as an exhibitor of the process must undergo. Protracted exposures are very undesirable on all accounts, and, therefore, I believe dermatitis should not occur at all with careful and cautious handling.

We should also note the interesting query of Dr. Lynn Thomas, of Cardiff—"Do 'X-rays' cause dermatitis?" In a letter on this subject in the *British Medical Journal* suggesting the possibility of the dermatitis being the result of an electrical influence in the neighbourhood of the conducting wires, he cites the fact that in some cases currents of unnecessary power were used.

In the cases which I have experimented on (over 150 patients) I am pleased to state there has never been a complaint of any discomfort whatsoever. Doubtless many other applications of the process in pathology might be quoted, but I have merely touched on those which have come under my own notice.

There are three tests which a good skiagraph should stand:—1. There should be a strong contrast between bone and flesh. 2. The outline of the bones should be clear and sharp. 3. There should be a good indication of the cancellous network in the interior of the bones.

Any good apparatus will give the first; but the second and third depend on the accurate rigidity of the part during exposure, to obtain which one requires a model patient, or a steady assistant. Indeed, the greatest difficulty I have had to overcome has been to study the conditions of maximum ease for each position of the limbs.

I fear I have already taken up too much of your valuable time, and I must ask your indulgence while I show you some lantern slides, after which I will hand round some skiagraphs, and then, if any members wish it, I shall be very pleased to show them the fluorescent screen working.

Mr. Haughton then projected on the screen a number of lantern slides illustrating the three classes of cases he had referred to—those of dislocations, foreign bodies (needles, bullet), tubercular disease and necrosis—demonstrating the various conditions remarkably well. Other slides also showed clearly the position of foreign bodies (safety pin and coin) in the larynx, bronchi, and œsophagus, inserted in the dead subject, in which also a good indication of the arteries in the root of the neck was obtained owing to the opaque injection which they contained.

PLATE I.[a]

No. 1.—Fœtus nine months: female. This skiagraph shows well the state of ossification at this stage of development. Note particularly the semicircular canals in petrous portion of temporal bone, the enamel caps on the still unerupted incisor teeth, also the condition of the elbow, wrist, knee, and ankle joints, contrasting the carpus and tarsus with regard to the relative amount of bone (ossific centres) and cartilage.

[a] The "negatives" from which these plates have been prepared all show much more "detail" than any "reproduction" process can represent. And it is the original negative which must be referred to in any critical examination of a skiagraph.

FIG. 1

PLATE II.

No. 2.—Normal Hand.—*Young Adult.* Note cancellous tissue, also the extra sesamoid bones over the index and little finger metacarpals.

No. 3.—Normal Hand.—Aged six years. Note centres of ossification of the phalanges.

No. 4.—Normal Wrist.—Aged eighteen. Note line of ossifying cartilage between epiphysis and diaphysis of lower ends of ulna and radius: the styloid process of ulna is still unossified.

No. 5.—Normal Elbow.—Aged three years. Most of the parts forming the joint being represented as "cartilaginous," and therefore transparent to "X-Rays."

No. 6.—Normal Ankle.—*Young Adult.* Note arrangement of cancellous tissue in os calcis and astragalus.

No. 7.—Abnormal Hand (congenital).—Aged eleven. Note that epiphysis for lower end of radius and ulna are normal—but carpus is represented by two or three elements more or less fused together. The long digit is the little finger, while the rest of metacarpus and phalanges are represented by the metacarpal of thumb, which bears on its head its own two phalanges, bent at an angle to one another, plus two other phalanges, and a lump of bone.

No. 8.—Congenital Deformity of Thumb.—Double distal phalanx. Cancellous tissue well seen in carpus and thumb metacarpal.

2

3

4

5

6

7

8

PLATE II

PLATE III.

"CLASS I."

No. 9.—EPIPHYSARY FRACTURE OF OLECRANON occurring at the age of ten years by muscular action, and some twelve years before skiagraph was taken; at present united by fibrous tissue, and a good and powerful joint.

No. 10.—DISLOCATION OF BOTH BONES OF FOREARM BACKWARDS.—Adult Without fracture, but with enormous swelling, and effusion into joint.

No. 11.—FRACTURE OF OLECRANON.—Adult. Comminuted.

No. 12.—FRACTURE OF EPIPHYSIS OF LOWER END OF HUMERUS.—Aged eight years. After treatment in plaster, which had accurately replaced the epiphysis. Note that olecranon process is still unossified.

No. 13.—UNUNITED FRACTURE OF TIBIA.—Aged five years. Lateral view.

No. 14.—NEEDLE IN FOOT.—(Normal adult female). "Vertical view."

No. 15.—NEEDLE IN FOOT.—(Same case as No. 14). "Lateral view." Showing needle within ¼ inch of plantar surface, which is resting on a thick book.

No. 16.—ANTERO-POSTERIOR VIEW OF TRUNK—(Dead subject)—Showing "safety pin" in larynx and a "coin" in œsophagus.

9

10

11

12

13

14

15

16

PLATE III

PLATE IV.

"Class II."

No. 17.—Tubercular Disease of Head of Metacarpal Bone of Index Finger.—Aged sixteen (?). The disease had been quiescent for some years, but skiagraph shows that the shortening of index finger is permanent, and due either to complete absorption of head of bone or "*premature union*" of head to shaft.

No. 18.—Tubercular Disease of Middle and Proximal Phalanges of Little Finger.—Aged thirteen (?). The disease here was recent. Note the "*rarefaction*" of the ends of these two phalanges, due to "rarefying osteitis," also "premature union" of epiphysis to diaphysis at base of proximal phalanx.

No. 19.—Ossifying Enchondroma of Metacarpal Bone of Middle Finger.—Note curvature of deformity of metacarpal of ring finger, corresponds to curve of base of tumour.

No. 20.—Necrosis of Lower Third of Ulna.—Note ulcerated surface on ulnar side of forearm; the lower half of shaft of ulna is seen to be *thickened*; several areæ of "rarefaction" are seen in the bone suggesting the outline of a sequestrum. Note "cloaca" at junction of middle and lower thirds of ulna on inner side under ulcerated surface. These points were all verified on examining the excised bone.

No. 21.—Same case as No. 20.—*Three weeks after operation.* Note that periosteum in neighbourhood of lower end of ulna has begun to form a new styloid process and articular surface.

No. 22.—Excision of Elbow Joint.—Note bony excrescences on ends of humerus, ulna and radius; also some islands of bone laid down in periosteum lying behind the new joint.

No. 23.—Tubercular Disease of Knee Joint.—Aged five years. Note thickening of shaft of femur (lower end), also central abscess near lower end of its diaphysis; also general disorganisation of knee joint. The quadriceps extensor muscle and its tendon are also indicated.

No. 24.—Normal Knee Joint.—*Adult female.* (Same case as No. 25). Note that articular surfaces of femur and tibia are sharply cut and well defined.

No. 25.—Tubercular Disease of Knee Joint.—Contrast articular surfaces of bones in Nos. 24 and 25, and it will be seen that in the diseased joint the *outline* of the articular surfaces of femur and tibia is obscure and ill-defined owing to rarefaction, while the "cartilaginous gap" is also diminished owing to erosion of the cartilage. (One marked symptom in this case was "starting pains"). Note commencing bony ankylosis between external condyle and outer surface of spine of tibia. The tendon of biceps is well seen.

17

18

19

20

21

22

23

24

25

PLATE IV

A large number of skiagraphs still further illustrating the application of the process were then handed round, after which, the hall being darkened, a demonstration with the fluorescent screen was given, during which the bones and joints of the leg up to middle of femur: of the arm, up to and including the shoulder joint, were clearly shown, also the cervical vertebræ, some bones of the face, and finally the movements of the heart and of the diaphragm and liver during respiration were well seen.

In the four plates which follow are reproduced some of the skiagraphs exhibited.

SECTION OF STATE MEDICINE.

THE REPORT OF THE VACCINATION COMMISSION, 1896.

By ALFRED E. BOYD, M.B., B.Ch. Univ. Dubl.

[Read in Section of State Medicine, April 30, 1897.]

In bringing the subject of the Vaccination Commission's Report before the Royal Academy of Medicine I do not do so with the idea of defending the practice of vaccination. Such a course would be mere waste of time in an audience composed of medical men, who, if they believe in anything, must believe in the usefulness of the practice.

In view, however, of the recommendations of the Commission, and as the subject will soon be brought before Parliament in order that the recommendations may be carried into effect, it is well that all interested in the public health should consider well the present state of the case.

What the provisions of the Bill to be introduced next Session may be we do not yet know, but it is certain that the "Anti-vaccinationist" Party will endeavour to do away with the principle of compulsory vaccination, which has been in force in England since 1850. The Report is a voluminous document of 220 pages, the result of seven years' work. During this time the Commission held 136 meetings, examined 187 witnesses, and investigated 6 epidemics.

The members of the Commission were appointed on the 29th of May, 1889, their names being as follows:—Baron Herschell, Sir James Paget, Sir Charles Dalrymple, Sir W. G. Hunter, Sir Edwin Galsworthy, Sir William Savory,

Mr. Charles Bradlaugh, Dr. J. S. Bristowe, Mr. W. T. Collins, Mr. Dugdale, Dr. Michael Foster, Mr. Jonathan Hutchinson, Mr. J. A. Picton, Mr. Samuel Whitbread, and Mr. F. W. White. Of these Mr. Bradlaugh died soon after the appointment of the Commission, his place being taken by Mr. J. A. Bright. Sir William Savory and Dr. Bristowe died at a later period, and their places remained unfilled.

The scope of the inquiry was defined as follows:—

(1.) The effect of vaccination in reducing the prevalence of and mortality from small-pox.

(2.) What means other than vaccination can be used for diminishing the prevalence of small-pox, and how far such means could be relied on in place of vaccination.

(3.) The objections made to vaccination on the ground of injurious effects alleged to result therefrom, and the nature and extent of any injurious effects which do in fact result.

(4.) Whether any, and if so what, means should be adopted for preventing or lessening the ill effects, if any, resulting from vaccination; and whether, and if so by what means, vaccination with animal vaccine should be further facilitated as a part of public vaccination.

(5.) Whether any alterations should be made in the arrangements and proceedings for securing the performance of vaccination, and, in particular, in the provisions of the Vaccination Acts with respect to prosecutions for non-compliance with the law.

Before going into the evidence regarding the effect of vaccination in reducing the prevalence of and mortality from small-pox it is well that we should briefly study the history of the disease and note its characters prior to the time of Jenner.

"A view very generally taken teaches that small-pox introduced from the East began to be common in Western Europe during the fifteenth century, though perhaps existing still earlier; that it increased during the sixteenth and seventeenth centuries, especially the latter, and that it was very prevalent during the eighteenth century" (Report, sec. 35).

Corfield states that "during the last century this disease killed on an average nearly half a million of people in Europe annually, and was severely epidemic about once in three years. In some years it caused half the deaths of children under ten years of age. It produced frightful disfigurements of the features, and caused from one-half to two-thirds of all the cases of blindness in Europe. In Iceland, in the year 1797, it caused a third of all the deaths in the island. Among the North American Indians it spread like 'a fire consuming the dry grass of the field, and persons who were not yet attacked by it slew themselves and their families rather than face this terrible disorder.' It spared no age, no rank of life, and no country, nor was it deterred by any climate. As lately as 1772, Maitland speaks of 'the havoc made in great families not many months since by that mighty disease,' which seemed then to go forth like a destroying angel, subduing all before it. Six members of the family of William III. died of it, while he himself suffered severely from it, and was permanently marked by it. Dr. Guy points out that 'in the last ten years of the century it was more than one hundred times as fatal as diarrhœa and its allied diseases, six times as fatal as apoplexy, palsy, and sudden death taken together, and seven times as fatal as the measles. During the last century, in fact, it caused in England one death in every twelve from all causes, and in France one in every ten'" (*The Laws of Health*, W. H. Corfield, M.A.).

In the town of Ware, in Hertfordshire, in 1772, out of a population of 2,515 at the beginning of the epidemic, 1,601 had previously had small-pox, leaving 914 susceptible persons. Among these there were during the epidemic 612 cases with 72 deaths, leaving at the end of the epidemic 302 persons, who having escaped the attack are spoken of in the record as "to have the small-pox." This gives the proportion of those who had had small-pox before the epidemic as 64 per cent., while after the epidemic it was 82 per cent. of the population.

In Chester, with a population of nearly 15,000, 85 per cent. had had the disease before the epidemic of 1774, while after the epidemic the percentage was 93.

There is no reason to think that the condition of things in Ware or in Chester was exceptional; it may probably be taken as illustrative of the condition of things elsewhere. (secs. 47, 48.)

The practice of inoculation for the small-pox began definitely in England towards the end of the first quarter of the 18th century. The first clearly recorded case in England is that of the daughter of Lady Mary Montague, inoculated by Maitland in London in 1721. It was found that the attacks induced by inoculation were, as a rule, milder and very much less fatal than the attacks of the natural disease, the fever and constitutional disturbance being less and of shorter duration, and the eruptive pustules much fewer in number. Received at first with enthusiasm, the practice of inoculation gradually dropped into disuse only to come into favour again at a later period; and there can be no doubt that between the years 1770–1780 inoculation was widely practised in England, and to be so continued until the end of the century. Since the inoculated person was infectious, each case was a source of danger to those who, not protected by a previous attack, came into his company, and this danger

was increased by the fact that the mild character of the inoculated disease in many cases permitted the patient to move about among his fellows (sec. 70).

Inoculation, therefore, while benefiting the individual, possibly increased the danger of the community.

That it did not always, however, benefit the individual, will appear from Jenner's statement, that—"Notwithstanding the happy effects of inoculation, with all the improvements which the practice has received since its introduction into this country, we sometimes observe it to prove fatal, and from this circumstance we feel at all times somewhat alarmed for its consequences" (*B. M. J.*, May 23rd, 1896).

Jenner observing the fact that persons connected with dairies who had contracted cow-pox while milking animals suffering from that disease were not susceptible to small-pox, proved experimentally that persons who had either taken cow-pox by contagion from the cow, or to whom it had been given by the operation of "vaccination," either with cow-pox matter from the cow or from a human being suffering from cow-pox, were equally insusceptible to the small-pox poison.

The results of his investigations were published in 1798. The practice spread rapidly during the first quarter of the present century, and prevailed widely.

It was beyond all question so adopted in the genuine belief that it afforded protection against small-pox (sec. 11.).

In 1802 the House of Commons made grants to Jenner and again in 1806, and annual grants were made to the National Vaccine Establishment which was founded in 1807, but it was not until 1840 that the first statute was passed dealing with the subject, entitled "An Act to Extend the Practice of Vaccination." By this Act guardians and overseers of every parish or union in England and Wales were empowered to contract with qualified practitioners for the vaccination of all persons resident in such unions or parishes respectively.

By the Act of 1840 inoculation was declared to be illegal, and the use of it was made penal. In the year 1841 there was supplemental legislation dealing with the expenses of carrying out the provisions of the Act of 1840.

By these Acts there was no compulsion on parents or others to procure or submit to vaccination, but the public vaccinators were to vaccinate all who might choose to come to them for the purpose.

The principle of compulsion was first introduced in the Act of 1850. It related only to those who had not already been successfully vaccinated. It seems, therefore, that re-vaccination was not contemplated. Under this Act the offence of not taking a child to be vaccinated within three months of birth was a single definite offence, and defendant, having been once convicted and fined, could not be proceeded against a second time.

Under the Act of 1867 the guardians of a child are bound to have it taken to the Medical Officer of the Dispensary District in which child is resident for the purpose of vaccination, unless it has previously been vaccinated by a qualified person. Upon the same day of the week following the child is to be brought back to the dispensary in order that the Medical Officer may re-vaccinate if necessary or obtain a supply of lymph. The Medical Officer must give the parent or guardian a certificate of successful vaccination, and transmit a duplicate certificate to the Registrar of Births of the district in which child was born.

Further Acts were passed in 1871 and 1874, and at the present time—

Failure to have child vaccinated within three months of birth, in absence of reasonable excuse, renders parent or guardian liable to a penalty not exceeding 20s.

Any person who prevents a medical officer taking lymph at a dispensary is liable to a penalty not exceeding 20s., and

failure to produce child when required to do so renders parent or guardian liable to a penalty not exceeding 20s.

The duties of prosecution are in the hands of the Boards of Guardians under the supervision of the Local Government Board.

These provisions are contained in the Irish Act of 1879. All this legislation is founded on the assumption of the efficacy of vaccination, and that it is the duty of the State to enforce it even by the imposition of penalties for its neglect. (secs. 86–127.)

We must now briefly inquire how far the assumption is justified.

The first quarter of the 19th century was characterised in this and other countries by a striking decrease of small-pox. In the London Bills of Mortality the returns of small-pox for the year 1800 are 2,409. This was the last return as high as 2,000.

From thence onward the numbers fell, especially after 1810, reaching in 1818 the low figure of 421, the fall being irregular, and marked by epidemics in 1812, 1817, and 1825.

A similar falling-off was noted in other parts of England, in Sweden, Denmark, and other countries of Western Europe, and in the United States (secs. 55–56).

One effect of the introduction of vaccination was the very great decrease in the practice of inoculation. Was this the cause of the decrease in small-pox? If so, in the 18th century there should have been a marked increase in the number of small-pox cases during the period when the practice of inoculation was most prevalent, but as far as the evidence goes, there was no such increase, nor is there sufficient evidence to show that the discontinuance of the practice of inoculation was a distinct subsidiary cause of the decline of small-pox in the 19th century (sec. 75).

Was the decrease due to improved sanitary conditions?

There is really no evidence to show that the first quarter of the present century was in any way differentiated from the proceeding quarter or half of the 18th century in the matter of sanitary improvements, and any advance which there may have been was in no way proportional to the the decline of small-pox. The decline, it must be noted, was equally evident in other countries in which no sanitary improvements were evident until a very recent period.

On the other hand, it must be noticed that wherever vaccination is introduced into a community previously unvaccinated, where small-pox is rife, the number of cases diminishes, and the type of the disease becomes milder (sec. 81).

Thus in Egypt vaccination was not introduced until 1827; up to that time small-pox was extremely prevalent, the decline which in Western Europe was marked during the first quarter of the century appears to have been absent there.

Similar observations have been made regarding the native tribes in North America, and also in Brazil.

There is no adequate evidence of a decline in unvaccinated countries like that which took place in vaccinated countries (sec. 84).

Speaking generally of the period since 1838, when the present system of registration of deaths commenced in England, there has been a marked, though irregular, decline in the death rate from small-pox (sec. 133).

If the improvements in sanitary conditions which have taken place during the last fifty years were the cause of the mortality from small-pox becoming less, we should expect to see that they had exercised a similar influence in the case of measles, scarlatina, whooping-cough, and indeed any disease spread by contagion (sec. 154).

In the case of measles, the decline in death-rate has not been at all comparable to that of small-pox. Until 1880

there was no sign of decrease in the death-rate of scarlatina. Small-pox stands alone as regards the decline in mortality, and that decline began with the introduction of vaccination.

The Commission investigated reports of six epidemics—viz., Gloucester, Sheffield, Warrington, Dewsbury, London, and Leicester. In Gloucester and Leicester the practice of vaccination had, to a large extent, been abandoned for some years prior to the recent epidemics in those towns.

In Leicester the percentage of births unaccounted for by the vaccinating officers, in 1892, was 80·1.

In Gloucester, in 1894, it was 85 per cent.

In Leicester the percentage of total small-pox deaths which occurred under ten years of age was 71·4, in Gloucester 64·5.

At Gloucester, 26 vaccinated children under ten were attacked, of whom 1, or 3·8 per cent., died.

Of unvaccinated children of similar age 680 were attacked, of whom 279, or 41·0 per cent., died.

Of vaccinated persons over ten 1,185 were attacked, of whom 119, or 10 per cent., died.

Of unvaccinated of similar age 88 were attacked, of whom 35, or 39·7 per cent., died.

It is unnecessary that we should consider the other epidemics—the figures are similar in each case; and, to use the words of the Report, "the conclusion is irresistible that some circumstance must have existed distinguishing the class selected as vaccinated from that selected as unvaccinated; the only condition which regulated the distribution of the cases into the one class or the other was the presence or absence of vaccination. It is only reasonable, therefore, to attribute the difference to vaccination" (sec. 219).

As regards the type of the disease—

If we take the epidemic at Warrington in 1891–92, Dr. Savill reports on the type of the disease in 661 cases, of

whom 593 were vaccinated or doubtful, and 68 unvaccinated. He includes amongst the confluent cases those which were malignant or hæmorrhagic.

Of the 593 vaccinated cases—

323, or 54·5 per cent., were mild.
141, or 23·8 „ discrete.
129, or 21·8 „ confluent.

Of the 68 unvaccinated cases—

3, or 4·4 per cent., were mild.
17, or 25·0 „ discrete.
48, or 70·6 „ confluent.

That is, amongst the vaccinated cases—

54·5 per cent. were mild, and 21·8 per cent. confluent.

Amongst the unvaccinated—

4·4 per cent. were mild, and 70·6 per cent. confluent.

These figures are typical of the results obtained from the investigations of the six epidemics. There appears to be sufficient evidence to point to the conclusion that the greater the number of vaccination marks the greater the protection in relation to small-pox enjoyed by the vaccinated person.

Statistics show that of the fatal cases of small-pox among the vaccinated—

7·6 per cent. had 1 mark, 7·0 per cent. had 2 marks.
4·2 „ 3 marks, 2·4 „ 4 „

(Sec. 293.)

As to the effects of re-vaccination,—at Leicester, at the end of 1892, the staff of the hospital consisted of 28 persons; 14 of these had either had small-pox or had been re-vaccinated before the outbreak; 8 others were vaccinated at the time of the outbreak; the remaining 6, although they had not previously been re-vaccinated, refused to submit to the operation. Out of the 28, 6 were attacked by the disease, of whom 1 died; 5 of the persons thus attacked by the disease, including the one fatal case, were amongst the 6 persons

who had refused to be re-vaccinated. The sixth case (a mild one) was that of a nurse who had been re-vaccinated ten years before (sec. 319).

Dr. Grimshaw states that at Cork-street Hospital, when he was on the staff of that institution, all the officers and servants were re-vaccinated, with the exception of one student who refused to be re-vaccinated. He died of small-pox!

At Cork-street Hospital, and also at the Hardwicke Hospital, during the epidemic of 1894–95, there was no single case of a recently successfully-vaccinated person contracting the disease.

With regard to "the effect of vaccination in reducing the prevalence of and mortality from small-pox," the Commission, having reviewed the evidence, find—

(1.) That it diminishes the liability to be attacked by the disease.

(2.) That it modifies the character of the disease, and renders it (*a*) less fatal and (*b*) of a milder and less severe type.

(3.) That the protection it affords against attacks of the disease is greatest during the years immediately succeeding the operation of vaccination. It is impossible to fix with precision the length of this period of highest protection. Though not in all cases the same, if a period is to be fixed, it might, we think, fairly be said to cover in general a period of nine or ten years.

(4.) That after the lapse of the period of highest protective potency, the efficacy of vaccination to protect against attack rapidly diminishes, but that it is still considerable in the next quinquennium, and possibly never altogether ceases.

(5.) That power to modify the character of the disease is also greatest in the period in which its power to

protect is greatest, but that its power thus to modify the disease does not diminish as rapidly as its protective influence against attacks, and its efficacy during the later periods of life to modify the disease is still considerable.

(6.) That re-vaccination restores the protection which lapse of time has diminished, but the evidence shows that this protection again diminishes, and that to ensure the highest degree of protection which vaccination can give, the operation should be at intervals repeated.

(7.) That the beneficial effects of vaccination are most experienced by those in whose case it has been most thorough. We think it may be fairly concluded that where the vaccine matter is inserted in three or four places it is more effectual than when inserted in one or two places only, and that if vaccination marks are of an area of half a square inch, they indicate a better state of protection than if their area be all considerably below this (sec. 377).

With regard to "the objections made to vaccination, on the ground of injurious effects alleged to result therefrom, and the nature and extent of any injurious effects which do in fact result"—

The diseases alleged to have resulted were—Tabes mesenterica, diarrhœa, bronchitis, pyæmia, skin disease, syphilis, convulsions, cholera, diphtheria, pneumonia, atrophy and debility, whooping-cough, erysipelas, and scrofula—a fairly formidable list. With regard to these diseases the Report says: "We do not find any facts to warrant the assertion that the increased mortality from tabes mesenterica and scrofula, or any part of it, was due to vaccination. Without encumbering our Report with the details relating to pyæmia, bronchitis, diarrhœa and skin diseases, which are all said to

have increased owing to the mischievous influence of vaccination, we may confidently say that there is no evidence to justify the statement" (secs. 396, 397).

With regard to syphilis: "The evidence offered to us would lead to the belief that whilst with ordinary care the risk of communication of syphilis in the practice of arm-to-arm vaccination can, for the most part, be avoided, no degree of caution can confer absolute security" (sec. 430).

With regard to erysipelas: "There can be no doubt that even very slight wounds may lead to erysipelas. It has been induced by scratches of pins, abrasions from the dress and other injuries, in themselves most trivial. A vaccination wound is like one from any other cause, so long as it exists, a source of some risk" (secs. 412, 415).

"A careful examination of the facts which have been brought under our notice has enabled us to arrive at the conclusion that although some of the dangers said to attend vaccination are undoubtedly real, and not inconsiderable in gross amount, yet when considered in relation to the amount of vaccination work done they are insignificant" (sec. 415).

The final recommendations of the Commission are as follows: "We put the use of calf lymph to the forefront, because, as we have said, this would afford an absolute security against the communication of syphilis. Though we believe the risk of such communication to be extremely small where humanised lymph is employed, we cannot but recognise the fact that, however slight the risk, the idea of encountering even such a risk is naturally regarded by a parent with abhorrence. We think, therefore, that parents should not be required to submit their children to vaccination by means of any but calf lymph; but this should not preclude the use of humanised lymph in case they so desire. So long as the State, with a view to public interest, compels the vaccination of children, so long even as it employs public money in

promoting and encouraging the practice, we think it is under an obligation to provide that the means of obtaining calf lymph for the purpose should be within the reach of all" (sec. 437).

With a view to diminishing hostility to the operation it is recommended that there should be an extension of age within which vaccination is required (sec. 439), and that vaccination vesicles should not be opened unless for some adequate reason (sec. 447).

Other recommendations follow: the preservation of lymph in tubes in place of on dry points, the sterilisation of all instruments used in vaccination, the substitution of the second week for the eighth day as the time for the inspection of the vaccinated arm, and the right of parents to call in the vaccinator on account of unfavourable symptoms prior to the time fixed for inspection (secs. 448, 449, 450).

"We have no difficulty in answering the question, 'what means other than vaccination can be used for diminishing the prevalence of small-pox?' We think that a complete system of notification of the disease accompanied by an immediate hospital isolation of the persons attacked, together with a careful supervision, or, if possible, isolation for sixteen days of those who had been in immediate contact with them, could not but be of very high value in diminishing the prevalence of small-pox. It would be necessary, however, to bear in mind two conditions of success—first, that no considerable number of small-pox patients should ever be kept together in a hospital situated in a populous neighbourhood, and secondly, that the ambulance arrangement should be organised with scrupulous care." However "we can see nothing to warrant the conclusion that in this country vaccination might safely be abandoned and replaced by a system of isolation" (secs. 499, 503).

The effects of keeping large numbers of small-pox patients

in a hospital situated in a populous neighbourhood are well seen in two diagrams which I have abstracted from "Parkes's Hygiene." Similar effects have been observed in Sheffield, Leicester, Warrington, and other places (sec. 474).

Further recommendations are—That power should be given to sanitary authorities to give compensation for loss of wages occasioned by isolation (sec. 506); that notification of small-pox should everywhere be made compulsory (sec. 534); that increased powers should be given to the local authorities with regard to common lodging-houses (sec. 507); that re-vaccination should be encouraged without being made compulsory (sec. 533); and that persons committed to prison by reason of non-payment of penalties under the vaccination laws should no longer be treated as criminals (sec. 535).

The weakest part of these recommendations is, I think, with regard to re-vaccination. In these days of compulsory education, means could surely be found for re-vaccinating children at the time when they enter school. No doubt there would still be a large number unaccounted for, but, on the whole, the number of re-vaccinated persons would be larger than it is at present.

When the Commission deals with the question of those who have an "honest" objection to vaccination, it makes a suggestion, but offers no very satisfactory advice as to how the suggestion could be carried out. The Report says:—"After careful consideration and much study of the subject we have arrived at the conclusion that it would conduce to increased vaccination if a scheme could be devised which would preclude the attempt (so often a vain one) to compel those who are honestly opposed to the practice to submit their children to vaccination, and, at the same time, leave the law to operate as at present to prevent children remaining unvaccinated owing to neglect or indifference of the parent." It is suggested that it might be provided that if a

parent attended before the local authority and satisfied them that he entertained such an objection no proceedings should be taken against him; or, again, a statutory declaration to that effect before anyone now authorised to take such declaration, or some other specified official or officials, might be made a bar to proceedings. "We do not think it would be any real gain to parents, who had no conviction that the vaccination of their children was calculated to do mischief, to take either of these steps rather than submit to the operation" (sec. 525).

While recognising the fact that the anti-vaccinationist cause has been assisted to a very great extent by the martyrdom of a few of its adherents, I fail to see that the procedure here suggested could possibly be free from abuse.

In the first place we are not told what is meant by the phrase "honest objection." Can an objection founded on ignorance be properly termed "honest?" Is the "honest objector" to be freed from his obligations by a statutory declaration in the case of laws dealing with matters other than vaccination? If so we may, in the future, expect to hear of publicans with "honest objections" to Sunday closing, and of members of the peace societies who have "honest objections" to income tax on the ground that the War Office is directly or indirectly supported thereby. Though these instances may be fanciful, I think the course suggested would form a very dangerous precedent if once legalised.

Again, the recognition of "honest objections" would put a premium on the endeavours of busybodies to convert the ignorant to anti-vaccinationist principles. Who could blame a fond mother for wishing to make a statutory declaration before a magistrate on hearing the terrible and oft-repeated tales of syphilis, erysipelas, and tuberculosis, to say nothing of leprosy and all the other diseases which are said to be

due to this practice? Once excite the mother's fears and in nine cases out of ten it will be impossible to get her to listen to reason, and in time the Vaccination Acts will become, for practical purposes, dead.

The Report of the majority is signed by eleven of the thirteen members of the Commission.

Sir William Hunter and Mr. Jonathan Hutchinson add that they are unable to recommend relaxation of the law with respect to the above suggestions, and recommend compulsory re-vaccination; while Mr. Whitbread, Mr. White, Dr. Collins, and Mr. Picton express their dissent from the proposal to retain in any form compulsory vaccination. They recommend that conscientious objection on the part of the parent should be respected, and that the offer of vaccination should be made at the home of the child, leaving the parent free to accept or reject the offer.

Dr. Collins and Mr. Picton alone dissent from the majority of the Commission in their opinion regarding the efficacy of vaccination.

I have gone into the evidence taken before the Commission very imperfectly; but I commend to your consideration its recommendations, based on the most elaborate accumulation of proof of the efficacy of vaccination as being of vast importance to all who are interested in the public health.

ON THE DISSEMINATION OF MICRO-ORGANISMS AND ON THE BEST METHOD OF DESTROYING GERM EMANATIONS FROM SEWAGE GAS.

By CHARLES R. C. TICHBORNE, F.C.S., F.I.C.;
Diplomate in Public Health, Royal College of Surgeons.

[Read in the Section of State Medicine, April 30, 1897.]

THERE are two characters of germ contagion, which may perhaps be best illustrated in the diseases of scarlatina and enteric fever.

In scarlatina we know that the contagion is largely conveyed by the desquamation.

In enteric fever the germs which are carried by sewer gas are supposed, with considerable force of evidence, to be a fertile source of spreading the disease.

In scarlatina we assume that the "Raft Theory," as Tyndall called it, plays an important part, whilst in the latter we must assume that the contagion is often carried with the vapours which emanate from the drains.

In my present communication I do not propose to deal at any length with the subject of the transmission of germs by the raft theory. It is fairly understood by most physicists and bacteriologists, but I may as well concisely describe it as most scientists understand it. Now we assume that the ordinary atmosphere, let us say at the sea level, is largely contaminated with a visible and ponderable matter which we term atmospheric dust. This atmospheric dust is found largely present in our homes, and also in the streets of populous towns. It consists of ponderable atoms, which at an altitude of a few feet almost entirely consist of organic matter. This fact was conclusively demonstrated by Tyndall's beautiful experiments in producing what he

called optical vacuums by the combustion of the organic matter. The coarser particles of this atmospheric dust act as floating rafts, and carry on their surface the finer structures of life. In the case of such a disease as scarlatina we can easily see how this raft theory plays an important part in the dissemination of the desquamation.

Even the smallest germs that our microscopes have yet revealed have a certain weight. This fact is shown by the absence of germs at high altitudes—such as Mont Blanc, or in a very still atmosphere, such as is found in the vaults of St. Michan's Church. I demonstrated this as far back as 1870, in an "Afternoon Lecture," delivered at the Royal Dublin Society. I showed that flasks placed all night in the vaults of St. Michan's Church were, when sealed next morning, optically empty, or free from atmospheric dust, and were therefore free from germs. We get in these vaults exactly the same result that we should find on the top of Mont Blanc. I believe this sterility of the atmosphere of St. Michan's Church has been the subject matter of one, if not more papers read before this Academy. I am sure it had escaped the author's observation that the ground had already been "prospected."

It is worthy of note that the greater part of practical bacteriology is now worked out by an observation which, I think, originated with Tyndall—that cotton wool was a perfect filter as regards this atmospheric dust, and that it not only acted upon the coarser particles but separated the finer micro-organisms.

I may be excused for still further referring to my own researches in this direction, mention of which will be found in the later editions of "Parke's Hygiene," by De Chaumont. I was able to demonstrate that even the dust at the top of Nelson's Pillar contained over 29 per cent. of organic matter and that it was capable of setting up the lactic fermentation

in a neutral solution of sugar of milk. Here is a solution of sugar of milk and lime, which although sterilised, when brought into an ordinary room containing atmospheric dust has fermented, and become solid by the formation of calcium lactate. The atmosphere at every yard that we rise from the ground becomes freer from the ponderous earthy constituents, but richer in germs. Of course, we at last come to an altitude where even the micro-organisms become scarce, and ultimately to such regions as the high altitudes of Switzerland where the germ is unknown. Even on the Mer de Glace the germs may be said to be absent.

So much for the raft theory, which will account for the dissemination of any germs, providing they have arrived at the dry condition, or that they can be attached to a dry particle. What can be more easy to conceive than the spreading of scarlatina by a process such as this. It is almost self-evident.

But there is another mode by which preventable disease is propagated which has never, to my mind, presented such a lucid explanation as regards its propagation. I refer to the theory which supposes that a certain germ, let us say like that accompanying enteric fever, cholera, or the poison of yellow fever, is capable of acting as a poison when evolved in sewer gas.

We have an organism which, when carried in water or brought mechanically to a receptive surface, is capable of producing disease, and yet we also find that it is capable of rising in a vapour as in sewer gas. I use the term "vapour" not in the vulgar sense, which assumes a non-permanent gas capable of condensation, but in the sense that means anything flying, or escaping off. In this sense atmospheric dust is volatile.

Two special diseases are supposed to arise from the air of sewers or fæcal emanations—typhoid fever and diarrhœa.

Yet if these diseases are caused by bacilli how are they volatilised, for however minute, these bacilli are still organic structures developed in the liquid fæcal matter. A pathogenic germ is so small that our finest balance will not weigh it, and although it may only be $\frac{5}{1000}$ths of a millimetre in length, we might as reasonably conceive that the coarser microscopic life, such as rotatoria or entomostraca, which we can almost see with our eyes, would be volatilised as a vapour, as to conceive that pathogenic microbes would be so transmitted. Prof. Frankland has shown that liquid sewage matter is not likely to be scattered into the air, except by gas generated in it. He experimented with lithia, a chemical substance not volatile, but which could be easily detected by the spectroscope, and might be said to represent micro-organisms. He found that no ordinary agitation of the sewer water would produce indications of lithia in the air, but that directly gas began to be generated in the sewage, by decomposition, the bursting of the gas bubbles carried lithia into the air.[a]

Now, I think here is the clue to the dissemination of microbes, but not exactly in the direction which he indicated. Such a condition of sewage—*i.e.*, in active fermentation—is hardly conceivable in a general sense in the better constructed drains found connected with houses of a good class—the houses, in fact, where typhoid seems to luxuriate.

We must suppose, however, in a system of town sewage, certain spots in the mains, where, from the Frankland cause, the microbes are scattered into the air during fermentation, or let us say violent concussions breaking the sewage into spray. And then comes the question—how are they disseminated through the whole area of the air space of the system of drains? I can easily conceive that they are

[a] Proceedings of the Royal Society, 1879.

carried there by a condensed vapour, exactly represented by ordinary dew at certain hours of the night, just as we see the rising vapour settling as dew in a valley. I believe that the temperature of the water laden vapour of the sewer is lowered by meeting with the layer of cold night air through the open traps which determines a dew point in the sewers themselves. I find, from actual experiment that the temperature of the sewer water as it flows from the large sewers, or the temperature of the gas in the mains, is generally 2 or 3 degrees above the temperature of the night air. The gas mains bear a somewhat similar position underground to the sewers, and give a very good idea of this variation of temperature. A variation of as much as 10 to 15 degrees may be observed. Even a sudden rise in the barometer will just determine the deposition of the liquid portions of the gas in the mains, and in the same manner will also determine, even more energetically, a dew line in the sewers. Each particle of dew becomes a raft which will carry microbes upon its surface, perhaps for miles, as long as this "dew" condition lasts; and as the sun's warmth dissipates the morning dew the water raft disappears, leaving the microbes suspended in mid-air—or, suppose that if the sewer dew is carried into a warm shaft connected with a dwelling-house, is not the assumption apparent that again we have the water rafts converted into permanent gas, whilst the now dry germs float about seeking whom they may devour?

I will just conclude by a few remarks upon sewage disinfection from this point of view. The disinfectants employed in sewage purification can hardly be viewed as actual germicides. The modes in which they are necessarily used create such an amount of dilution that they can be viewed only as retarders of the development of microbes. It is, no doubt, chiefly from this reason that

they are not more extensively used in sewage purification. The return in results, as regards the prevention of diseases, is not commensurate with the great expense of oxidisers, such as permanganates and hypochlorites. They are not in favour, because unless they are used in overwhelming quantities they are worse than useless. They destroy myriads of microbes, but allow myriads to escape—and to the remainder they only seem to add fuel to the fire. It is true that at the pumping stations in London, manganate of sodium is used, or was used, but in such a case it is merely employed as a deodoriser at the end of the process, whilst the supernatant fluid is being poured into the river.

From the reason of cheapness crude carbolic acid (which may be considered to owe its virtue to phenol, cresylic acid, and a little naphthalene) is extensively used. Although not a very decided germicide, phenol still holds an important place as one of the most valuable retarders of germ development. Naphthalene is still more powerful, and may be looked upon as a germicide proper. Although very cheap, it has one objection, namely, its great insolubility.

I have here a fluid which I have used with some success for years in controlling or instantly stopping germ development: there are many occasions when the use of mercuric chloride is inadmissible.

It consists of:—

Crystallised Phenol	1 part.
Camphor	3 parts.
Naphthalene	½ part.

Coloured with rosaniline carbolate.

It will be observed that though these are all solids they form a fluid on rubbing together. One drop of this liquid will instantly arrest any tube of microbe culture in gelatine at a given point, and may be used with advantage to place on record comparative experiments with microbe cultures.

In such an experiment I have found it advantageous to use a little stiffer nutrient gelatine than that given in Crookshank's work. I increase the formula given there from 100 grammes of gelatine to 120 grammes (*vide* Crookshank's Manual of Bacteriology, 3rd Edition, p. 83).

Now it is a similar preparation to the above preservative which I should propose for sewage purification, with one modification which I consider invaluable. Crude carbolic acid (phenol) is comparatively cheap, and naphthalene may be viewed as a waste product in the process of coal tar distillation. For the camphor I would substitute terebene, which may be looked upon almost as a liquid camphor. Where the sewers of a large city are being provided for, or where cost is a question of importance, the light oils of tar may be substituted.

Now I will describe the scientific theory, by which, I believe, this disinfectant can be made a trap for typhoid bacilli or germs of a like nature in sewer gas.

The principle involved consists in adding some liquid body which shall bring the specific gravity of the antiseptic below the gravity of the sewer water. When such a body is used the antiseptic fluid forms at once a fine pellicle of antiseptic material. All fluids that are volatilised or mechanically eliminated by the escape of gas must pass through the germicide layer. If carbolic acid or the crude phenol products are used by themselves, we find, in practice, that they immediately sink to the bottom of the flowing sewage which passes along over the top in a continuous stream of untouched pollution. The crude products obtained from the distillation of coal tar are specially suited to this purpose. When coal tar is distilled in the first instance it is divided into two divisions—one is called "light coal tar oil," and the other "heavy coal tar oil." The first contains all the products which come over as long as they will float on water, and

they are specially rich in the benzene, naphthalene and terebene series, all of which are powerful germicides. By substituting these oils for terebene we get an antiseptic fluid which immediately spreads on the surface of the sewage, locking in the deleterious vapours, and at the same time passing downwards the heavier antiseptics, such as the phenols, through the sewage by the simple act of solution.

This can be illustrated by the following simple experiment. If we pass, by a pipette, a layer of carbolic acid into a shallow dish of water, and after standing some little time draw off some of the supernatant water, we shall find on testing it with a little bromine water that it contains no carbolic acid. If, in a second experiment, we use such a mixture as I have specified, but which must have a specific gravity of ·850 to ·950, we shall find, on introducing it into the water with the pipette, that it immediately rises to the surface, and if we at once remove some of the water from the interior it gives, on testing with bromine water, a copious precipitate, showing that the carbolic acid has permeated at once through the fluid which represents the sewage. We should further find, on examining this fluid, that the powerful antiseptic naphthalene had been carried with it.

I have endeavoured in the above experiments to show why, in many cases, the use of carbolic acid has been a practical failure as a sewage purifier, and to indicate that, in dealing with such contagions as are diffused through sewer gas, a principle should be adopted in the use of antiseptics. This principle has not, as far as I know, been openly enunciated—namely, that we must disinfect from the surface of the flowing sewage, and not from the bottom.

Sir Charles Cameron said that he was much interested in the question of volatility of micro-organisms. He had been much startled, he said, by recent papers upon sewage air published by various gentlemen, which appeared to show that the air from

sewers in London, Aberdeen, and other places contained a very small number of micro-organisms, much smaller, indeed, than the air above the sewers. He had been much surprised at the statement of an Italian who recently said that it was impossible to discover the bacilli of typhoid fever in the dejecta of patients suffering from enteric fever. According to this authority, several thousands of examinations had been made with the above result. With regard to the statement that liquids would not disengage micro-organisms, he had the utmost distrust in such a statement, and did not believe that these were not the micro-organisms of the disease in the dejecta of patients. He himself had found great quantities of organisms in the dejecta of patients from Cork-street Hospital. He was much interested in Professor Tichborne's statement that the very bubbles of vapour came up containing the germs contained in the liquid. It has been proved, he said, that sea water, on the calmest day, carries up salt into the air derived from the placid evaporation of the sea water, and, therefore, he could not accept the theory that liquids were unable to disengage the pathogenic bacilli which happened to be present in them. He had traced an outbreak of typhoid fever to milk supplied by a man in whose house there were two typhoid patients. In this case, the sanitary arrangements being rather imperfect, the stools had been kept for several days, until fermentation had occurred, and were then deposited in a receptacle for ashes in the yard, and there being open communication between shop and yard, he concluded that the bacilli had been carried into the shop and became absorbed by the milk. To prove the correctness of this theory, he made many experiments which consisted in placing dejecta of typhoid patients in an open vessel, at a little distance from some milk in vessels, and covering the whole thing with glass; examination revealed swarms of bacilli in the milk. Counter experiments were made at the same time with ordinary dejecta and milk, and no such bacilli were developed. He concluded that during the fermentation of fæces containing the bacilli there was an actual evolution, and that they escaped in gases. Perhaps this accounted for the fact that perfectly fresh fæces were not infective, but that putrefaction was necessary for gases to be evolved and carry the germs into the air. Crude carbolic acid was never used for disinfecting sewers, but Jeyes' liquid was generally used—one part of the liquid to one hundred parts of water; Jeyes' fluid was also more economical.

Dr. Doyle asked if sewer gas, which was a very complex gas,

was heavier or lighter than ordinary atmospheric air. Was it to be understood that sewer gas increased the virulent qualities of disease producing organisms, that these organisms were volatile, that they came out of ventilators used to prevent disease, and were carried about like dust. He said that he was in favour of taking away all in-taking and out-taking shafts connected with drains, because he believed that the so-called sewer gases were nature's disinfectants, and, he had no doubt, were more efficacious than many carbolics, &c. The tubercle bacilli went to a certain stage and produced a certain product accompanied with a most disagreeable odour, but the bacilli were destroyed. In Dublin, in connection with the Liffey, there was a large open surface where the organisms had a chance of getting down; there was a large open space in the Liffey and a muddy shore where the organisms were caught and putrefactive changes continually going on.

Dr. S. M. Thompson stated that he had read that it was only after decomposition had set in that the virus of typhoid was liberated.

Professor Tichborne, in reply, said, with regard to the question of the transmission of the typhoid germ by sewer gas, or, in other words, the capability of the organisms to rise from water and become permanent contaminations of the atmosphere, that he did not presume to state that such was the fact, but nevertheless he believed that such a thing really did occur. In reference to Jeyes' fluid, he did not know if it was more economical than other disinfectants, and its value depended on the amount of carbolic acid which it contained.

THE RECENT FAILURE OF HOSPITAL ACCOMMODATION IN DUBLIN.

By SIR CHARLES A. CAMERON, M.D.;
Superintendent Medical Officer of Health for Dublin.

[Read in the Section of State Medicine, May 10, 1897.]

In a report dated 29th January, 1895, and addressed to the Public Health Committee of the Corporation of Dublin, I recommended the establishment, outside the city, of a hospital for infectious cases. The Committee approved of the suggestion, and requested me to prepare a scheme. In conjunction with Dr. Thomas Stafford, Medical Inspector of the Local Government Board, a scheme for providing increased hospital accommodation was prepared. It proposed that a Board, somewhat on the lines of the London Asylums Board, should be established, and that its members should be the nominees of the Corporation of Dublin, the two Boards of Guardians, the Township Commissioners, and the Local Government Board. The care of the sick from fevers and the conveyance of fever patients to hospital would be entrusted to this Board and its staff.

On the invitation of the Public Health Committee, and with the sanction of the Municipal Council, conferences of representatives from all the above-named authorities were held. The scheme was discussed and was approved of by the representatives of several of the local authorities, particularly by those from the North Dublin Board of Guardians. Opposition to the scheme was, however, soon manifested. The Council of the Dublin Sanitary Association passed a resolution condemning it. The physicians of several of the Dublin Hospitals opposed it. My friend, Dr. John W. Moore, in a paper read before the combined Sections of

Medicine and State Medicine, denounced it, and some of the newspapers had rather unfavourable articles in reference to it. The scheme, under these adverse influences, had to be abandoned, but I trust only for a time.

Three arguments were used against this scheme: 1st, that it would be enormously costly; 2nd, that there was ample accommodation for the treatment of infectious diseases in existing hospitals; 3rd, that it would interfere with medical education. I shall make a few observations in reference to each of these objections.

As to the alleged enormous cost of the scheme, I am altogether at a loss to understand upon what ground this objection was made. If the proposed Board had come into existence it would not have found itself compelled to provide large hospitals in various parts of the metropolitan district. In all probability it would have made provision for meeting future epidemics of small-pox, and would have established a home for convalescents from fever—desiderata which all admit; such a Board would probably determine whether or not the existing hospitals were able to cope with severe epidemics of measles or scarlet fever. It is conceivable that they might arrange with existing hospitals for the treatment of extra patients, or they might secure premises for temporary hospitals. If it did not perform action of this kind it would be useless, but such action would not involve the enormous expenditure which the critics of the scheme alleged would be the result of it.

As to the alleged sufficiency of the existing hospital accommodation, the inexorable logic of facts has demolished that argument. No one will now deny that during part of last year and of the present one, scores of patients suffering from infectious diseases were refused admission to the hospitals.

That the scheme would, as alleged, seriously interfere

with medical education, seems to me improbable. In the first place it did not affect the general or other hospitals in which fever is treated and students taught. No one can decry Edinburgh and Glasgow as medical schools of the first rank; yet students in the former city have to go to special fever hospitals to acquire a knowledge of contagious diseases. It is the same in Glasgow, London and other places. This argument has been so thoroughly refuted in Dr. M'Hugh's admirable Address at St. Vincent's Hospital that I need make no further observation in reference to it.

The recent failure of hospital accommodation in Dublin justifies me in bringing the subject of isolation hospitals and convalescents' home again before the Academy of Medicine.

During the six years ended in 1896 the zymotic death-rate was moderate—in Dublin nearly 2·6 per 1,000 of the population—and was decidedly below the mean rate of the English towns. With the exception of an epidemic of small-pox and a rather large amount of scarlet fever, there were no epidemics in those years, until nearly the close of the sixth one. The zymotic death-rate in the first half of 1896 was reduced to the unprecedentedly low figure of 1 per 1,000, and the fever hospitals were comparatively empty. In the second half of the year three diseases were epidemic—namely, measles, scarlet fever, and whooping-cough. At the last week of 1895 there were in hospital 11 cases of small-pox, 0 of measles, 112 of scarlet fever, 1 typhus fever, and 65 typhoid fever—total 189. In the last week of 1886 there were 162 cases of measles, 193 of scarlet fever, 14 of typhus fever and 50 of typhoid fever, total (including convalescent), 442; exclusive of 23 convalescents from that disease in the Cork-street Hospital Convalescent Home, Beneavin, Finglas.

In 1894 the Public Health Committee made the strongest representations to the Boards of Guardians as to the absolute necessity for providing accommodation for small-pox, which

was at the time threatening to assume an epidemic form. It was, however, not until Cork-street and the Hardwicke Hospitals were overcrowded with small-pox patients that the South Dublin Board of Guardians erected sheds at Kilmainham, not far from the workhouse. A large number of convalescing patients were removed to the sheds, though some of the patients did not relish the idea that they were virtually transferred to a Union hospital.

Last year when it became evident that measles and scarlet fever were becoming epidemic, the Public Health Committee made strong representations to the Boards of Guardians as to the urgent necessity for making provision to meet the epidemics. The same delay which characterised the action of the Guardians in 1894 was displayed in 1896, and it was not until long after the hospitals had ceased to afford sufficient accommodation for infectious cases that hospital accommodation was provided at Kilmainham, and the congestion of the hospitals diminished. It was most fortunate that during the small-pox epidemic there were comparatively few cases of other zymotic diseases. Had the converse been the case there would not have been sufficient accommodation for them. Unfortunately when measles became epidemic scarlet fever also was prevalent, and the severer cases of the e diseases were so numerous that the hospitals were crowded with them.

The duty of removing fever patients to hospital devolves upon the Sanitary Authority, and during the latter part of 1896 and the earlier portion of 1897 the Dublin Sanitary Authority was unable to discharge this duty fully for lack of the necessary hospital accommodation. Very bad cases of measles and erysipelas had to be retained in tenements of the most wretched kind, as no hospital accommodation could be procured for them.

At the period when the congestion of the hospitals had

attained its maximum, a case of small-pox occurred on the south side of the city. The patient was a young woman, whose brother-in-law had recently returned from South Africa, and had taken up his abode in his sister's house. I ascertained that there had been a case of small-pox in the vessel in which he had made his homeward voyage, and it seems in the highest degree probable that he brought the contagion of the disease in his clothes or other effects. The patient was most anxious to be brought to a hospital, but as no hospital would admit her the authorities of the South Dublin Union took charge of her, and appointed a medical man to attend her. There were four persons living in the house, and two of them were paid by the Guardians to act as nurses. With a view of preventing, if possible, the healthy inmates of the patient's house from spreading the disease by going about town I appointed two men to act, as it were, the part of sentinels outside the patient's house. They were to warn persons against entering it, and to go upon any messages entrusted to them by the inmates. They were cautioned not to enter the house under any circumstances. Unfortunately, one of them disobeyed this order, and more than once entered the house and sat down in the parlour. He became a second patient, and as he was only a lodger we had to place him in a house belonging to the Corporation, which is intended to be a refuge for families whose houses are undergoing disinfection. This poor fellow died. Some unjustifiable comments were made in reference to the appointment of this man. It was clearly my duty to isolate the people in the house in which small-pox had broken out, and in order to do this it was absolutely necessary to place some one at their service who could order provisions for them, take their messages, &c. The poor fellow whose fate I have mentioned was an old man; he assured me that he had been re-vaccinated. The medical man in charge of the patient desired to

again vaccinate him, but, as I afterwards heard, he declined to permit the operation.

A third case occurred in the person of a male nurse sent by the Board of Guardians to nurse the second patient. At this time, therefore, three cases of small-pox had occurred, and had to be treated in houses in populous districts. If at this time there had been a serious outbreak of small-pox the want of hospital accommodation would have produced disastrous effects upon the community.

From the time that it was evident we were in for an epidemic of measles in addition to one of scarlet fever then raging, the Public Health Committee were incessantly pressing upon the two Boards of Guardians the urgent necessity of increased hospital accommodation. After considerable lapse of time, terms were made with Cork-street, the Hardwicke, Mater Misericordiæ and Meath Hospitals for admission of infectious cases. The Meath Hospital retired almost immediately from this arrangement on the ground that they required all their accommodation for patients who has special claims upon it. It soon became evident that the hospital accommodation would soon fail, and the Guardians were constantly urged by Dr. Stafford, the Local Government Board's Inspector, and the Public Health Committee to put up hospital sheds. Ultimately, but not until long after complete congestion of the hospitals had taken place, the Guardians of the South Dublin Union provided accommodation for patients on the grounds at Kilmainham. A large number of convalescing scarlet fever and measles cases were transferred from Cork-street Hospital to the Kilmainham sheds, and a department of the Cork-street Hospital was then assigned for small-pox cases, of which, however, only two sought admission. If there had been an isolation hospital ready for small-pox patients, the first of the cases to which I have adverted could have been removed to it at once, and

probably no other case would have originated from it; there is no doubt that the four cases of this disease which occurred after its appearance in the house at Ashbrook-terrace were due to the contagion from that house.

Dr. Falkiner said that there ought to be no doubt in the minds of the citizens of Dublin that the hospital accommodation was quite insufficient in the event of three or four epidemics occurring at the same time. He asked if it was possible to stop the spread of measles by taking measures, and if not, was it possible to provide for all the children—say under five years of age—who were living in a large city like Dublin, and who had never been in contact with the infection of measles. He believed that if medical officers took very strict precautions at the beginning of epidemics, the disease could be stopped, and he considered that measles was not a disease which must spread broadcast of necessity.

Dr. J. W. Moore said that the Public Health Act of 1896 conferred upon rural authorities all the rights of combining that were previously confined to urban authorities. He strongly advocated an isolation hospital for small-pox, and thought it a burning disgrace that Dublin did not possess such a hospital. He also thought it a shame that the local authorities had never availed themselves of the full powers given them in 1878 to establish convalescent homes for the treatment of those recovering from infectious diseases. It was not necessary to keep measles or scarlatina in a ward for three and six weeks respectively, as it endangered the other patients in the ward, but a convalescent home was required to which to send them. He brought forward statistics of the enormous number of cases of measles and whooping-cough which occurred in Dublin during the first three months of 1897, and showed that it would not be possible for so many cases to be treated in any set of permanent hospitals. Did Sir Charles Cameron think that if the hospital accommodation had been sufficient in Dublin, the extent of the epidemic would have been materially restricted, and that, as a result of hospital accommodation, measles spread indefinitely in Dublin? He (Dr. Moore) said that, so far as the Meath Hospital was concerned, hospital accommodation had not been exhausted, as out of forty-four beds for infectious cases not more than thirty had been occupied at any one time, and the rest were at the disposal

of the boards of governors if they had agreed to the terms of the Meath Hospital, which were that a sum of two-and-sixpence per head a day should be paid, in order to cover expenses. Only one shilling and sixpence had been offered, but was not accepted. He maintained that there was need of an isolation hospital for small-pox, and that it was a disgrace that no convalescent accommodation was provided for infectious cases. He held that the existing law gave the authorities of Dublin perfect power to unite for the proper purpose. He had seen children admitted to hospital suffering from three epidemic diseases. He agreed with Dr. Falkiner that the early isolation of children where measles had broken out—provided the children had not been brought into actual contact with infection—was a check on their being attacked with the disease.

Dr. Doyle thought that an isolation hospital was necessary. He thought that ground for the purpose of erecting temporary institutions should be taken, and said that the best results in the treatment of infectious diseases had been obtained in such buildings. It was a question whether it would not be better for the community at large that all hospitals should be built in such a condition that, after a certain number of years, they should be burnt down. He thought that medical officers in charge of dispensaries should go round the patients collected in the waiting-rooms, and there and then detect those that should be separated. He had known numerous cases of children brought to dispensaries, and in the waiting-room take infectious diseases.

Dr. Delahoyde considered that there was an urgent need of isolation hospitals. There should be one body, composed principally of medical men, to look after the erection of such hospitals. At present there was divided authority, and therefore divided responsibility, devolving on the Local Government Board, Boards of Guardians, and the Sanitary Authorities. With regard to Dr. Doyle's suggestion about selecting patients with infectious diseases from those collected in the waiting-rooms, he said that if the authorities required that done they might appoint a proper staff for the purpose, as he, for one, as a dispensary medical officer, would not discharge that duty.

Dr. Potter was of opinion that any communicable disease should not be treated in a general hospital. He agreed with Dr. Doyle in saying that hospitals for the treatment of infectious diseases should be of a temporary nature, and considered that temporary buildings could be erected at small cost.

Sir C. Cameron, in reply, said that he did not agree with Dr. Moore as to increased powers having been given to rural authorities. The Boards of Guardians had always power to combine, but had only power to act like an ordinary sanitary authority, and the urban sanitary authority had not power to combine with a rural sanitary authority. He objected altogether to hospitals for infectious purposes being limited to paupers or to subscribers to hospitals. With respect to the accommodation for measles cases, he said that if there were enormous numbers of cases it would be difficult to obtain accommodation, but surely it was the want of accommodation that led to the enormous number of cases. He gave instances to show that there really had been lack of hospital accommodation during the epidemics. During the epidemics, notification, he said, had really been of great use. He urged that the notification of measles in Rathmines should be made compulsory.

Proposed by Sir C. Cameron; seconded by J. W. Moore:—

"That the Section of State Medicine of the Academy of Medicine is of opinion that the Sanitary Authority of the Dublin District should provide accommodation for convalescents from infective diseases, with the twofold object of checking the spread of such diseases and of relieving the congestion of hospitals during epidemics. The Section is further of opinion that provision should be made by above Authorities to provide like accommodation for small-pox cases."

SECTION OF ANATOMY AND PHYSIOLOGY.

NOTE ON THE ORGANIC SULPHATES OF THE URINE.

By DENIS J. COFFEY, M.B., F.R.U.I.;
Lecturer on Physiology and Histology, Catholic University Medical School.

[Read in the Section of Anatomy and Physiology, February 5, 1897.]

The researches of physiological chemists have long ago established a connection between certain urinary substances and the process of putrefactive decomposition, which occurs in the alimentary canal as a normal accompaniment of intestinal digestion. These substances are variously known as the conjugate, the ethereal, or the organic sulphates of the urine. They form only a small proportion of all the sulphates excreted, the ratio of the organic to the inorganic being in normal urine as 1 to 10; but they possess a special physiological interest on account of the nature, variety, and origin of their bases, while, from a clinical point of view, their importance may be gauged from the fact that they form an accurate index to the amount of putrefaction going on, not alone in the alimentary canal, but in the body at large. It will, therefore, be convenient to refer briefly to the antecedents of these bodies before dealing with the subject-matter of this investigation.

The course of intestinal digestion presents a remarkable contrast with that of the gastric juice in the readiness with which bacteria develop in a pancreatic mixture. The HCl of the gastric juice effectively frees the contents of the

stomach, once digestion is well advanced, from microbic activity; but the fluid of the small intestine has no such protective property, and digestion in this part of the alimentary canal is therefore normally accompanied by a series of chemical changes initiated by bacteria, and leading to the decomposition of a considerable portion of the food stuffs. To these changes are due the formation of gases, the foul odour, and other well-known features of the contents, as they descend the ileum. All the chief food principles—proteids, carbo-hydrates, and fats—would appear to suffer in varying degrees from this process; but to the decomposition of the proteids is particularly due the putrefactive character which the contents assume. The more notable products of this putrefactive decomposition of the proteids are the substances, indol, skatol, phenol, and cresol—complex organic compounds, but incapable of assimilation, and manifesting their presence by the foul odour which they give to the intestinal fluids. They are removed in part by the fæces, and in part also, after absorptions into the blood, by the kidneys. In their passage from the alimentary canal to the kidneys they are slightly modified, entering probably into various combinations, and finally they appear in the urine as the organic or ethereal sulphates.

While intestinal putrefaction is thus seen to be a fact of ordinary occurrence, it is known to be largely increased in many conditions of disease. The most common case is where, owing to a deficient secretion of HCl in the stomach, the normal protective mechanism is weakened, and microbic activity is correspondingly augmented. We thus find it associated with many diseases of the stomach, and notably with cases of dilatation. In jaundice, pernicious anæmia, sequelæ of measles, and many other conditions accompanied by impaired digestion, a similar increase in the putrefactive decomposition occurs. Diminished secretion of HCl and

deficient intestinal absorption have been laid down as the chief causes of increased putrefaction. So that in a great variety of cases an examination of the organic sulphates of the urine would yield valuable information on the state of the alimentary canal. They increase in proportion to the decomposition going on in the intestine, and thus form a useful and ready clinical guide to its amount.

The tests for the individual organic sulphates, except in the case of indican, are not satisfactory, nor easy of application. It is well known, however, that the correct determination of the amount of putrefactive change is to be found in the ratio of the organic sulphates to all the sulphates present—organic and inorganic together.

We have, therefore, only to estimate the amount of H_2SO_4 present in the conjugated form, and compare it with the total H_2SO_4 in order to arrive at this result. Many physicians are content with demonstrating the presence of indican (which is the urinary equivalent of indol—indoxyl sulphate of potassium) and accept the formation of a good reaction to Jaffé's test as a sufficient proof of increased intestinal putrefactions, but the method is imperfect and misleading, as the proportion of indican to the other organic sulphates is by no means fixed. The true measure of putrefaction is only to be found in the ratio of the organic to all the sulphates present.

I have recently examined the urine of patients suffering from dilatation of the stomach, and have made a quantitative estimation of the sulphates with the results here reported. They will be seen to be confirmatory of the statements made above. My friend, Dr. Dempsey, who had charge of the patients in hospital, made an examination at the same time of the gastric contents, and kept a daily record of the proportion of HCl in the gastric juice. He ascertained that

the quantity of acid had diminished to one-fourth the normal. From a case of dilatation of the stomach:—

Case I.—Urine of J. K., examined Jan 12th; 500 cc. of urine yield ·116 gram. organic sulphates.

Case II.—Urine of J. K., examined Jan. 19th; 300 cc. of urine yield ·072 gram. organic sulphates.

In this specimen the reaction to Jaffé's test for indican was very feeble, while the gravimetric estimation showed a distinct excess of the sulphates.

Case III.—Urine of J. K., examined Jan. 24th; 200 cc. yield ·054 gram. organic sulphates.

The results were obtained by Salkowski's gravimetric method. A mixture, consisting of one part of barium chloride saturated in the cold, and two parts of saturated solution of barium hydrate, was added to an equal quantity of urine, and the resulting precipitate filtered off. The ordinary inorganic sulphates were thus removed, but the organic sulphates remained in the filtrate. By the addition of 10 cc. HCl per 100 cc. of filtrate, the latter were slowly thrown down, when the mixture was kept for a day or more at a temperature of 100° C. The precipitate was then collected on a filter paper of known ash, and the whole removed, placed on a platinum crucible, and ignited to redness. It was then dried over H_2SO_4, and weighed. After deducting the weight of the crucible and the paper-ash we have the weight of the conjugates H_2SO_4 determined as a sulphate of barium. From this one can easily estimate the amount of the conjugated acid.

The results given above are equivalent to ·34 gram. in Case I., ·36 gram. in Case II., and ·405 gram. in Case III., for 1,500 cc. of urine in each case. They represent an increase from the normal one-tenth to, at least, the one-eighth part of the total sulphuric acid of the urine, allowing a

margin for errors in estimation. The HCl in the gastric juice was notably diminished in quantity during the whole period in which the patient was under observation.

Dr. Purser thought such observations of great importance, as indicating the amount of putrefaction in the intestine. He thought that it was rather the proportion of the conjugated to the total sulphuric acid than the absolute amount of the former which was important. He usually followed the method of Baumann in the estimation.

Dr. McWeeney said that without questioning the importance of the issues that might be decided by the determination of the relation between preformed and conjugate sulphates, he thought the operation too complicated for general clinical purposes. The estimation of indican yielded results that would in most cases prove sufficient. He found that nitric acid acted more efficiently than the hypochlorite in causing the separation out of indigo blue. In his opinion the latter substance was a sufficiently accurate measure of the amount of intestinal putrefaction, so that it was unnecessary to resort, save in rare instances, to the major operation of determining the preformed and the ethereal sulphates.

Dr. Coffey, in reply, said that he found Jaffé's test for indican satisfactory enough, but that he thought his cases established the view that this particular organic sulphate might not be notably increased, while the gravimetric method indicated a distinct increase in the total of organic sulphates as compared with all the sulphates of the urine. The reason why a diminution in the HCl. of the gastric juice should lead to increased putrefaction in the intestine was connected with the destructive action of the acid on bacteria.

THE SURGICAL APPLIED ANATOMY OF THE RECTUM.

By EDWARD H. TAYLOR, M.D., F.R.C.S.;

Surgeon to Sir Patrick Dun's Hospital;
University Examiner and Lecturer in Anatomy in the School of Physic of Trinity College.

[Read in the Section of Anatomy and Physiology, February 5, 1897.]

Until comparatively recently it was customary to describe the rectum as that part of the large intestine extending from opposite the left sacro-iliac articulation to the anus, and the loop between it and the termination of the descending colon was known as the sigmoid flexure, and in most of our text-books this description still obtains. However, I agree with Mr. Treves, that it is better to consider the rectum as extending from the level of the third sacral vertebra. Between the point where the colon reaches the iliac fossa on the left side and the point where it comes to lie opposite the third sacral vertebra it consists of a single loop which is said to resemble in outline the Greek capital omega. It is connected by a mesentery to the iliac fossa and posterior pelvic wall. This mesentery varies considerably in length in different subjects, the mobility of the loop of course varying accordingly. This latter is usually found coiled in such a way as to form a series of minor loops which, when the bladder is empty, lie for the most part in the cavity of the true pelvis. The three longitudinal muscular bands are also continued downward over the entire extent of this loop, and it is only from the third sacral vertebra onwards that the longitudinal muscular fibres are uniformly spread over the tube. (Cunningham.).

For convenience sake I shall name the portion of the loop with its mesentery in the iliac fossa the iliac colon, and the remainder with its mesentery in the pelvis, the pelvic colon.

The drawing reproduced in Figure 1 was originally prepared to illustrate an example of iliac retention of the testis, but it shows also very well the loop of intestine to which I

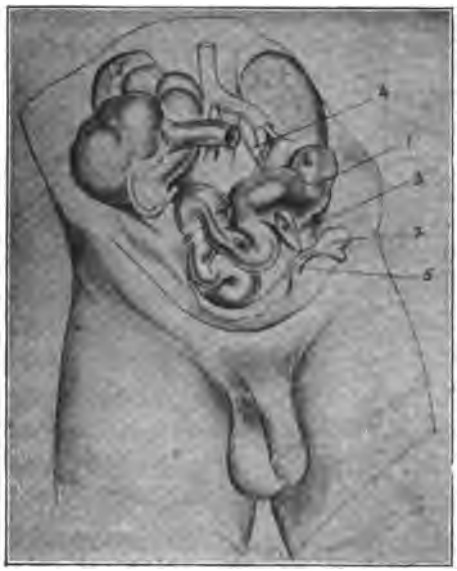


FIG. 1.

View of the iliac and pelvic colon:—1, the colon; 2, body of testis and epididymis; 3, the plica vascularis; 4, the spermatic vessels; 5, the plica gubernatrix.

have just referred, extending from the iliac fossa above downwards into the pelvis.[a]

[a] Fig. 1.—The body of the testis with the epididymis are connected to the iliac fossa by the mesorchium. From the upper border of this two folds of peritoneum are seen extending towards the intestine. The inner is attached to the gut, but the outer is observed to contain between its layers the spermatic vessels (4); this is the plica vascularis (3) Lockwood. From the lower border of the mesorchium another fold is seen extending towards the internal abdominal ring; this is the plica gubernatrix (5). From the base of the mesorchium the vas deferens can be observed passing into the pelvis. See Jacobson on "The Diseases of the Male Organs of Generation."

In Figure 2 the rectum is seen cut in its entire length, and for the greater part of its extent its curvature is seen to be adapted to that of the sacrum and coccyx. The backward direction of the anal canal is well marked, and the internal sphincter which encircles it is very evident (6). Within the rectum a well-marked ridge of mucous membrane is seen, situated opposite the rectovesical peritoneal reflection (9). This is one of the folds described by Houston as the "valves

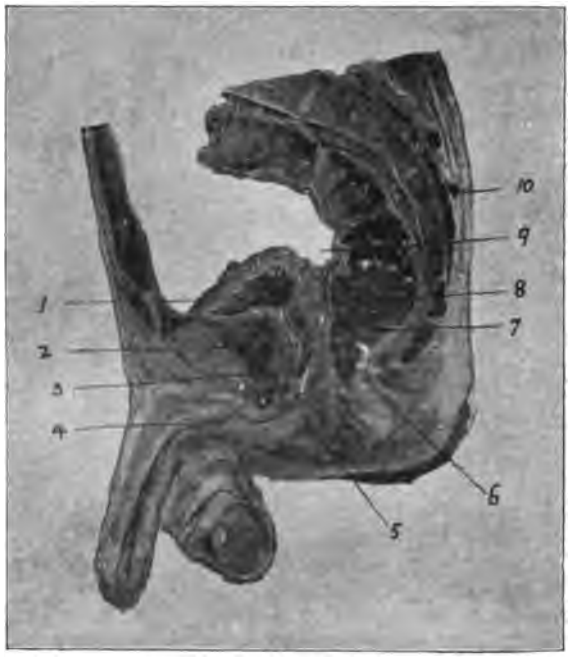


Fig. 2.

Mesial section through the pelvis of an adult male (Cunningham):—1, bladder; 2, retropubic pad of fat; 3, prostate; 4, urethra; 5, bulb; 6, internal sphincter; 7, rectum; 8, vas deferens; 9, peritoneal reflection; 10, sacrum.

of the rectum." It is of a permanent character, not being obliterated when the bowel is distended. This fold, seen in the section lying on the right lateral aspect of the rectum,

was named by Kohlrausch the "plica transversalis recti." It is also to be noted that at the anal canal the mucous membrane is arranged in a series of longitudinal ridges. These are the columns of Morgagni or the columnæ recti. When the bowel is distended they become obliterated. The bladder is nearly empty. Observe the sinking downwards of its superior wall following the escape of its contents; and also the level of the peritoneal reflection from it to the

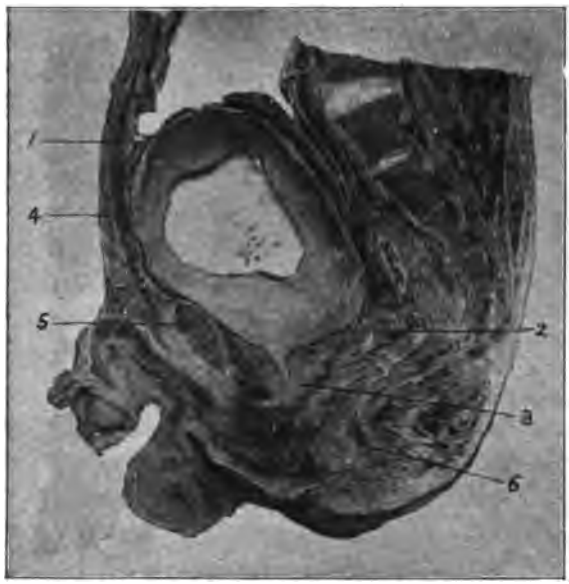


FIG. 3.

Mesial section through the male pelvis in which the bladder is greatly distended (Cunningham): — 1, peritoneal reflection; 2, peritoneal reflection (recto-vesical); 3, prostate; 4, rectus abdominis; 5, symphysis pubis; 6, internal sphincter.

anterior abdominal wall, reaching almost to the symphysis pubis. The white rod has been passed through the common ejaculatory duct and the black rod lies in the sinus pocularis (uterus masculinus). The urethra has been cut in its entire

extent. Observe the almost vertical direction it pursues in its prostatic stage.

In the section shown in Figure 3 the rectum has not been cut in its entire extent as it has not followed the middle line accurately in its downwards course. Note the reflection of peritoneum from the rectum to the bladder (2). It would appear in this instance at all events that distension of the bladder has not caused it to assume an appreciably higher level, thus contrasting in a very marked degree with the reflection from the bladder to the anterior abdominal wall, which has been raised for a considerable distance (1). On the other hand, when the rectum becomes distended, the recto-vesical reflection assumes a higher level, but this is not due to any change in the relative position of the bladder and peritoneum, but to the entire bladder with the reflection being pushed upwards and forwards by the loaded gut. (Cunningham.)

In Figure 4 the rectum has been cut in the suprasphincteric zone, and it is observed to lie slightly to the left of the mesial plane. The coccyx (5) appears on its posterior aspect and, on each side, the coccygeus musele (8) extends outwards towards the spine of the ischium (7). The anterior relations of the rectum also are to be noted. They are the seminal vesicles (3) which in this section are situated antero-laterally. The recesses in their interior are very distinct. Between the seminal vesicles and immediately in front of the rectum, observe the two vasa deferentia (4), each possessing a very thick wall and a very narrow lumen. Farther forwards the bladder (2) is seen in a very beautiful way; on its right side the ureter (6) is cut just before its termination, while on the left side it appears traversing the bladder wall. Within the bladder the inner opening of the urethra is very evident as well as the folds of mucous membrane radiating from it. This appearance may to some extent be due to

the sphincteric action exercised by the prostate upon the urethra just at its commencement. The rugose character of the bladder mucous membrane is also well seen in this its flaccid condition. In front of the bladder are some coils of

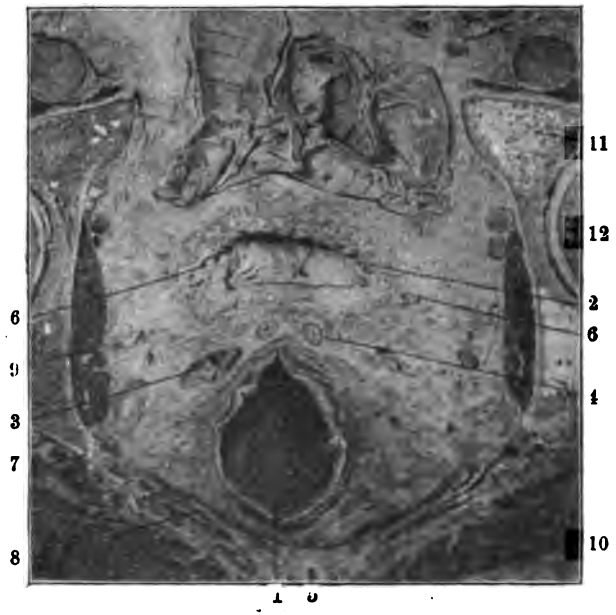


FIG. 4.

Horizontal section commencing immediately above the symphysis pubis in front and passing backwards with a slight inclination downwards (Cunningham):—1, rectum; 2, bladder; 3, seminal vesicle; 4, vas deferens; 5, coccyx; 6, ureter; 7, spine of ischium; 8, coccygeus; 9, obturator internus muscle; 10, glutæus maximus; 11, os innominatum; 12, head of femur in the acetabulum.

intestine. This relationship results from the empty condition of the former, for when the urine is expelled the superior wall of the bladder sinks downwards into the pelvis, and upon its concave upper surface (Fig. 5, 2), the intestines rest, consequently they have been implicated by the section. On

each side, the obturator internus muscle (9) lies in relation to the inner aspect of the pelvic wall.

The rectum as seen in the section shown in Figure 5

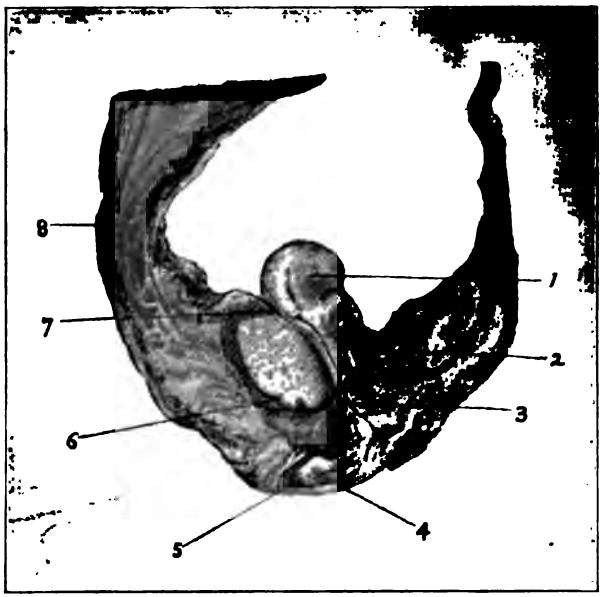


Fig. 5.

Mesial section through a female pelvis (Cunningham):—1, uterus; 2, bladder; 3, vagina; 4, perineal body; 5, anal canal; 6, rectal ampulla (suprasphincteric zone); 7, recto-vaginal pouch (Douglas); 8, sacrum.

presents a highly instructive appearance. Observe the contracted anal canal (sphincteric zone) directed downwards and backwards. The mucous membrane in its interior is arranged in a series of longitudinal folds which radiate from it at its upper extremity. The more capacious suprasphincteric region (6) is well marked. Note the very decided projection, in a downward direction, towards the perineum, which is presented by its anterior wall just above the anal canal. Higher up the recto-vaginal pouch (7) is

seen in front of the rectum. The uterus is anteflexed, and as it inclines to the right side the section in the upper part does not cut it into two equal and symmetrical portions. The empty bladder with the urethra in mesial section presents an outline resembling the letter Y, and the sinking downwards of the superior wall of the bladder is well seen in this, its empty condition.

The rectum, beginning opposite the third sacral vertebra where the mesentery of the pelvic colon ceases, is directed from behind forwards, and from above downwards, but does not invariably follow the middle line throughout, being sometimes slightly deflected to one or other side. (Figs. 3, 4, and 10.) Having extended beyond the tip of the coccyx, and down to where the levatores ani reach its sides (Figs. 6 and 7), its lumen becomes suddenly diminished, and bending upon itself here it is directed from before backwards (Figs. 2 and 5) to its termination at the anus. This terminal narrow portion is called the anal canal, and immediately above it the capacity of the rectum is at its maximum. (Fig. 5.) This part has received the name of rectal ampulla.

The posterior relations of the rectum are the same in both sexes. They comprise the lower part of the sacrum, and the coccyx, below which the rectum is applied against the levatores ani muscles and the ano-coccygeal raphe. (Fig. 7.)

The rectum, however, does not come into immediate relation with the sacrum, between them we find the presacral tissue in which are lodged some pelvic lymphatic glands together with the larger branches of the superior hæmorrhoidal artery (Fig. 10).

In front, the rectum at its commencement is invested by peritoneum, and when the bladder is empty it is usually overlaid by coils of intestine. In the male, the bladder when distended comes into relation with it (Fig. 3), and in the female, the uterus.

The subperitoneal portion of the rectum in the male forms the posterior boundary of the recto-vesical pouch; in the female it bears a similar relation to the recto-vaginal pouch (pouch of Douglas). (Fig. 5.)

The anterior relations of the extraperitoneal portion of the rectum in the male are the base of the bladder (Figs. 2, 3, and 11), the seminal vesicles and vasa deferentia as they converge towards each other in front. (Fig. 11.) They are separated from the rectum, however, by a well-defined layer of fascia, the recto-vesical. (Fig. 11.) Then we meet with the prostate enveloped in its sheath (Fig. 12), and just below this the rectum takes its backward bend, and at its termination is separated from the bulb of the corpus spongiosum by an interval which has a triangular outline in mesial section. (Fig. 2.)

In the female, the anterior surface of the rectum in its extra peritoneal part is in relation to the posterior vaginal wall. (Fig. 5.) They are separated below, however, by a mass of tissue which has received the name of perineal body.

It is of considerable practical importance to remember that the connection between the rectum and vagina at their upper part is not at all intimate, so that they can be easily separated from each other during operation. This is much more difficult to accomplish lower down where a tough mass of tissue lies in front of the bowel. (Fig. 5.)[a]

We shall now proceed to study those muscles which collectively constitute the sphincteric apparatus of the rectum. They are the two sphincters and the levatores ani.

The external sphincter (Fig. 8) is a voluntary muscle which surrounds the anus, arising behind from the tip of the coccyx and from the ano-coccygeal raphe. It divides

[a] The photographs No. 2, No. 3, No. 4, and No. 5 were obtained by the kind permission of Professor Cunningham from frozen sections in the Anatomical Department, Trinity College.

into two portions which surround the anus in an elliptical fashion, meeting in front, where they are inserted into the central point of the perineum. Some of the superficial fibres are attached to the integument of the anterior and posterior extremities of the anus.

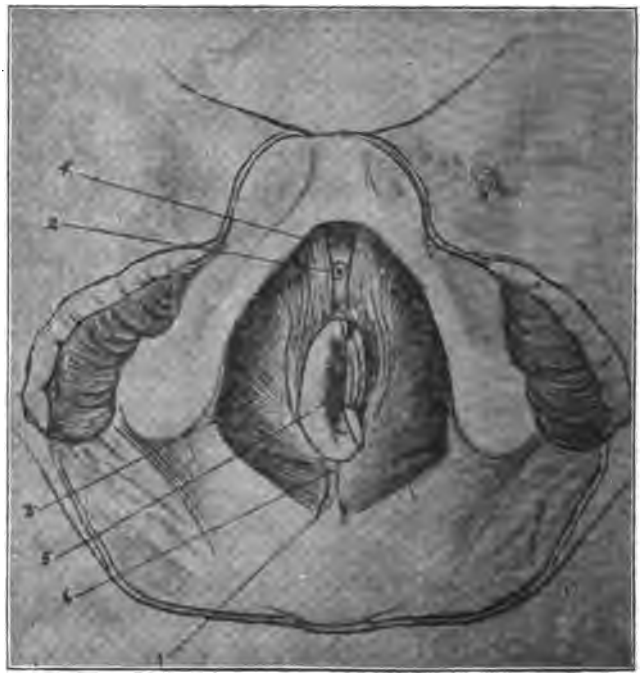


FIG. 6.

The deep surface of the levator ani muscle:—1, the coccyx; 2, the urethra; 3, the levator ani; 4, the prostate; 5, the anus (the terminal, extra-pelvic portion of the rectum); 6, the ano-coccygeal raphe.

The internal sphincter is an involuntary muscle, of pale aspect, and of rather feeble power. It is formed by a thickening of the circular muscular coat of the rectum for about an inch at its termination, where it surrounds the anal canal. Its extent is well seen in Fig. 2.

Figure 6 has been taken from a specially prepared dissection, with the object of explaining the part played by the levatores ani in the sphincteric apparatus of the rectum.

As the fibres of each muscle proceed from their origins,—viz., the pelvic surface of the body of the pubis, the pelvic fascia, the inner aspect of the ischial spine,—they are seen to reach their insertions in the following manner: The posterior fibres pass downwards and inwards to the side of the coccyx. The anterior fibres take an antero-posterior direction to the lower end of the rectum, and do not, as is described in some anatomical text-books, meet the opposite muscle in a median raphe between the rectum and prostate. When they reach the rectum some of them take a downward direction, passing between the external sphincter and the outer longitudinal muscular coat of the bowel, and are attached to the skin at the anal margin. They constitute the true levator ani. The intermediate fibres have varying degrees of obliquity as they are directed towards the side of the rectum and to the median raphe between the tip of the coccyx and the anus.

Between the anterior borders of the two muscles in front of the rectum, the urethra is seen emerging from the prostate (2, 4).

In addition to other structures, the external sphincter has been removed in this dissection, and on the left side that portion of the anus also has been removed which this muscle normally surrounds, in order to show the anterior fibres of the levator ani as they pass towards their insertion lying in relation to the rectal wall.

This dissection also shows how the two levatores ani muscles form, as it were, a muscular button-hole through which the rectum passes and by which it is laterally compressed. To put it briefly, when these muscles contract, the anus is raised; the lower part of the bowel (sphincteric zone) is

constricted, and the suprasphincteric portion lying against the median raphe is drawn forwards.

Figure 7 has been drawn from one of the models prepared by Professor His (Leipzig).

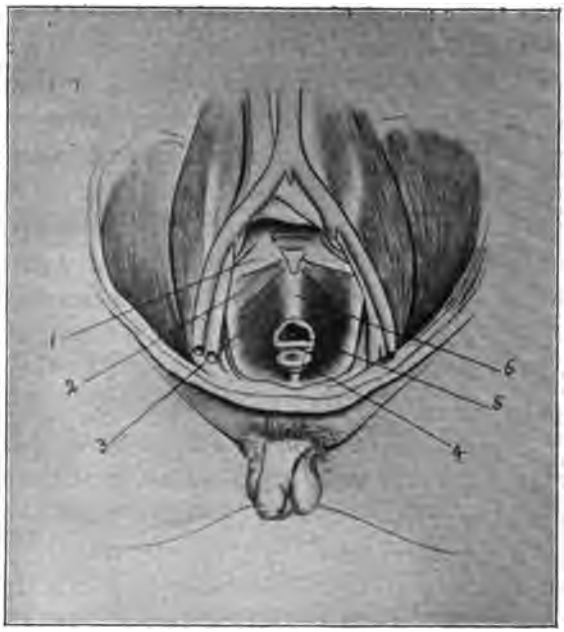


FIG. 7.

The pelvic diaphragm viewed from above:—1, lesser sacrosciatic ligament; 2, coccygeus; 3, levator ani; 4, prostate; 5, rectum; 6, ano-coccygeal raphe.

The levator ani is seen on its pelvic aspect, its anterior fibres, not so well indicated as in the model itself, passing backwards beside the prostate (4) to reach the side of the rectum, the posterior fibres taking a more or less horizontal course to the side of the coccyx and the intermediate set sweeping backwards to the median raphe (6). The coccygeus (2) also is seen lying behind the levator ani, with the pos-

terior border of which it is continuous. The lessor sacro-sciatic ligament lies farther back, continuous at its anterior (lower) border with the coccygeus muscle and its posterior (upper) border bounding the great sacro-sciatic notch. It is to be observed, also, how the levatores ani support the rectum below the coccyx. The portion of the rectum seen here (5) is the dilated suprasphincteric segment (ampulla). This illustration also shows how the posterior aspect of the rectum can be exposed by incising the ano-coccygeal raphe. It is very evident, too, that if the lower part of the sacrum and the coccyx be removed, as is recommended for some sacral operations, the pelvic diaphragm having lost its posterior attachments, will become relaxed, and the pelvic organs consequently will be badly supported.

It is very instructive to investigate the sphincteric apparatus of the rectum in the living subject. On introducing the finger into the rectum, the narrow anal canal can be made out, both as to its extent and tonicity, and above it one can easily identify the more capacious suprasphincteric region. Now it is often stated that the upper limit of the sphincteric zone felt in this way is caused by the internal sphincter. However, the sensation of constriction conveyed to the finger here is really caused by the levatores ani where they are in contact with the rectal wall. (Fig. 6.) Again, if we request the patient to contract the anus forcibly, it is easy to appreciate two contracting zones; a superficial one, which is due to the external sphincter, and one more deeply placed, which is both voluntary and sudden in its action, and which is, no doubt, constituted by the levatores ani muscles, and not by the internal sphincter whose contraction is slow and independent of the will.

Figure 8 represents one of a series of dissections which, by the kind permission of Professor Cunningham, I have been enabled to make in the Department of Anatomy Trinity

College, for the purpose of illustrating some points in the applied anatomy of sacral excision of the rectum. The

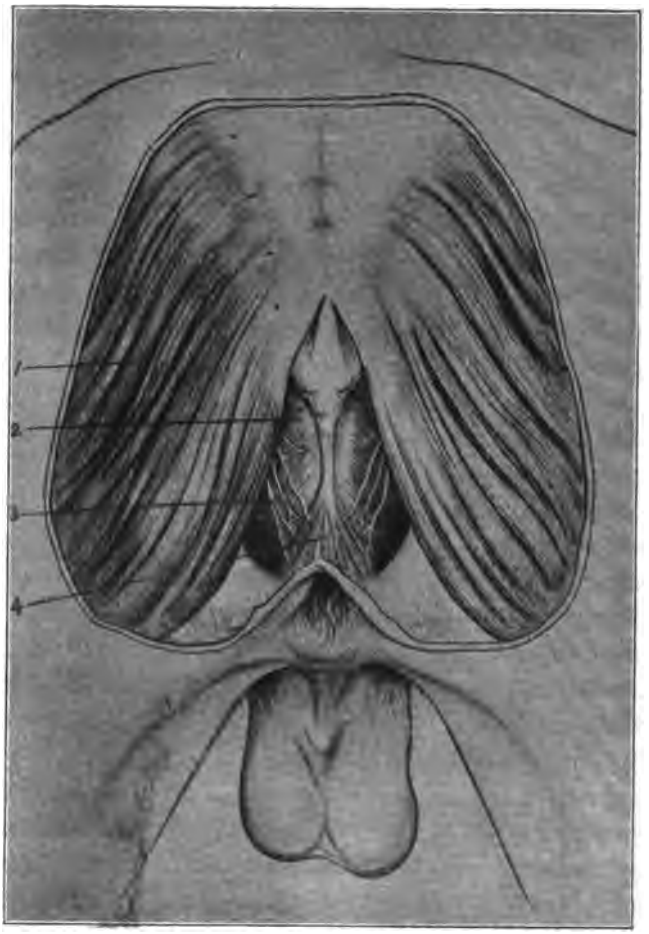


FIG. 8.

1, Glutæus maximus muscle; 2, levator ani; 3, inferior hæmorrhoidal vessels and nerves; 4, sphincter ani externus.

The black dots over the sacrum indicate the levels of the first, second, third, and fourth posterior sacral foramina. The subject was placed face downwards, and the lower extremities were allowed to hang over the end of the table while this and the three subsequent dissections were being made.

glutæus maximus muscle (1) is seen on each side with its strongly-defined fasciculi. The inferior hæmorrhoidal vessels and nerves (3) are directed downwards and inwards through the ischio-rectal fossa.

In figure 9 the glutæus maximus muscle (1) has been separated on each side from its inner attachments and turned outwards. The great sacro-sciatic ligament (5) is well seen on the left side, wide at its two extremities, but much narrower at its centre. On the right side it has been divided, and the two portions have been drawn aside so as to display the subjacent structures. It is not unusual to find this ligament pierced close to its sacral attachment by one or more arterial branches coming from the sciatic (7), and some of them may be of considerable size. It is worth bearing in mind that these may be cut during the separation of the soft tissues from the side of the sacrum in the course of operation and may bleed freely. On the right side the coccygeus (3) is seen, continuous at its lower border with the levator ani (2) and at its upper border with the lesser sacro-sciatic ligament (6). It consists of a flat triangular sheet of fleshy and tendinous fibres which arises by its apex from the spine of the ischium and is inserted by its base into the border of the coccyx and lower part of the sacrum.

The lesser sacro-sciatic ligament (6) springs from the spine of the ischium and expands as it passes inwards to be attached to the sides of the last two sacral vertebræ. This ligament, together with the coccygeus, may, in reality, be said to form a single structure.

The internal pudic artery and nerve (9) appear crossing over the ischial spine, below which they lie in contact with the inner surface of the obturator internus muscle (10) and pass from view beneath the obturator fascia.

The inferior hæmorrhoidal nerve is seen emerging with the internal pudic at the great sacro-sciatic foramen, and

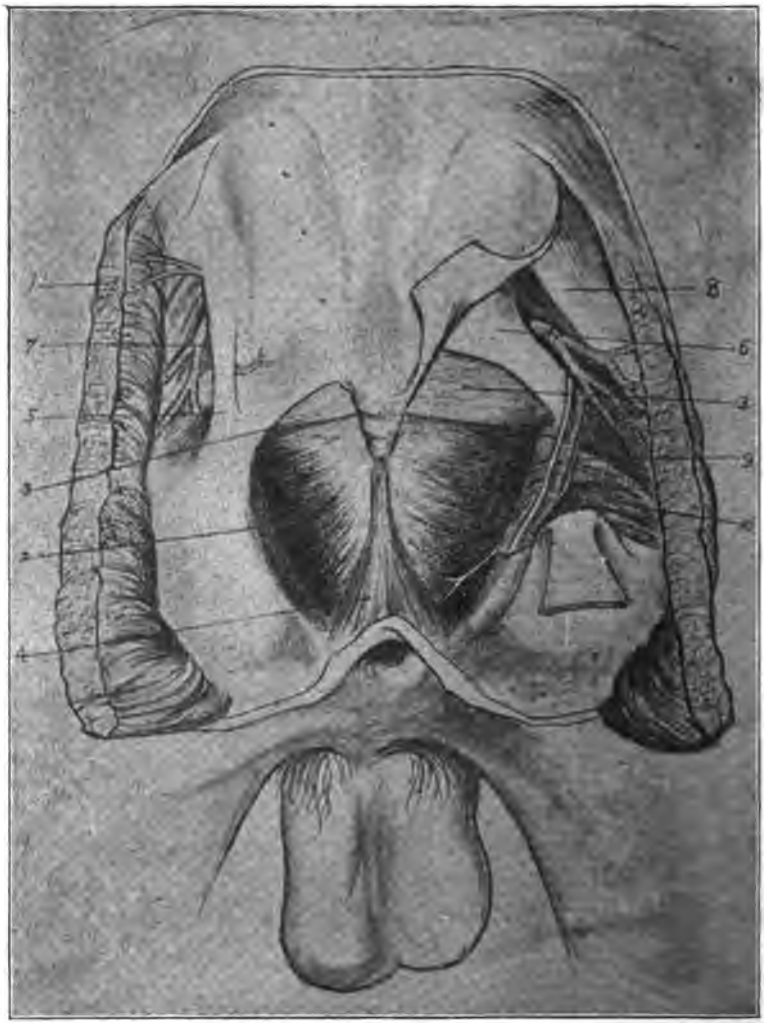


FIG. 9.

1, Glutæus maximus muscle; 2, levator ani; 3, coccygeus; 4, sphincter ani externus; 5, great sacro-sciatic ligament; 6, lesser sacro-sciatic ligament; 7, sciatic artery; 8, pyriformis muscle; 9, internal pudic artery and nerve; 10, the obturator internus muscle.

running for a considerable distance with the parent trunk before passing inwards across the ischio-rectal fossa to reach the external sphincter which it supplies.

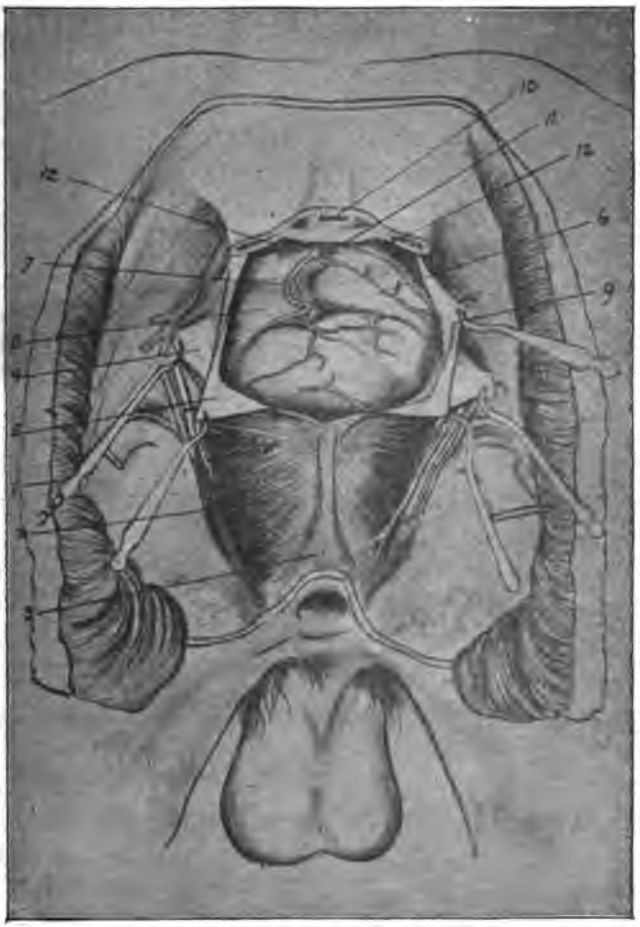


Fig. 10.

1, Glutæus maximus muscle; 2, levator ani; 3, sphincter ani externus; 4, the lesser sacro-sciatic ligament (separated from sacrum and drawn outwards); 5, the pelvic fascia; 6, the rectum; 7, superior hæmorrhoidal artery (left main division); 8, the pelvic peritoneum; 9, middle hæmorrhoidal artery; 10, the sacral canal; 11, middle sacral artery; 12, lateral sacral artery.

In Figure 10 the sacrum has been cut transversely between the third and fourth sacral foramina and the lower part of the sacrum with the coccyx has been removed. The pelvic fascia (5) was then exposed as a loose membranous layer concealing the rectum from view. It was freely incised and its edges were held widely apart, as seen in the illustration. The middle hæmorrhoidal artery (9), which is seen piercing it, was observed to come off from the sciatic artery on both sides. In defining the rectum and the arterial branches which ramify upon it, a considerable quantity of fatty tissue had to be removed as well as several lymphatic glands. The two main branches of the superior hæmorrhoidal artery (7) are seen as they flank the rectum on each side, and their subdivisions spreading over the muscular coat of the bowel before piercing it, to reach the submucous layer. The rectum, which had not previously been disturbed in any way, was found at this point to take a well-marked curve to the right (6). The pelvic peritoneum (8) is seen bulging backwards to the left of the rectum. It is interesting to note the small size of the sacral canal (10) as compared with the entire cut surface of the bone. The middle sacral artery (11), which is sometimes of considerable size, may, when the sacrum is cut across, give rise to smart hæmorrhage, and this is sometimes difficult to control, owing to the close manner in which the vessel is applied to the bone. The above site of bone section is that recommended by Bardenheur in sacral excision of the rectum. It affords free access to the pelvis owing to the large breach made in its posterior wall, extending, as it does, from one ischial spine to the other.

In figure 11 the levatores ani muscles were separated from each other in the middle line down to a point near the anus. The two segments of the pelvic diaphragm were then retracted laterally, as seen in the illustration. A piece of the

rectum, about two inches in length, was removed and the distal end was allowed to hang downwards over the anus.

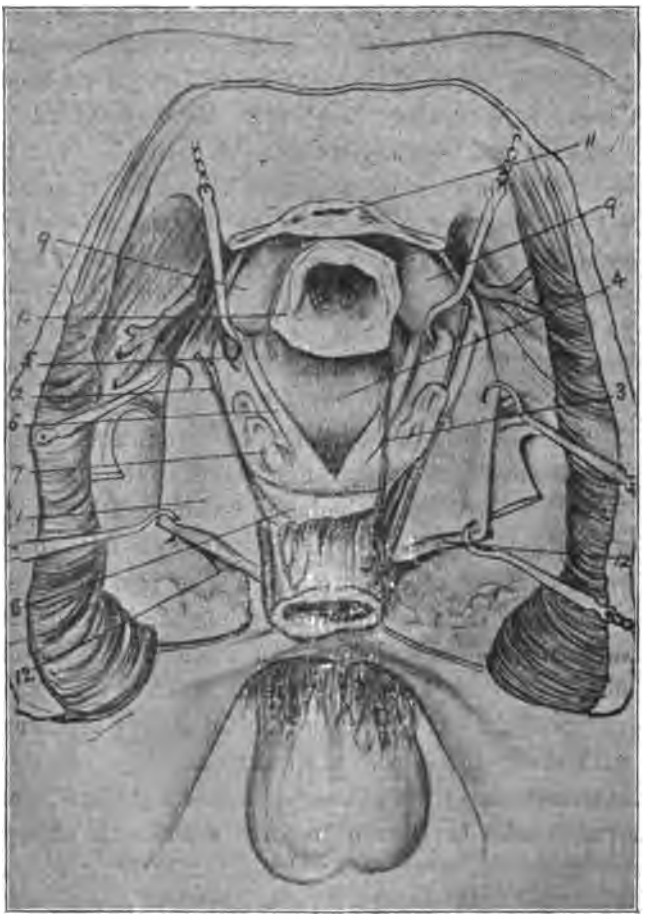


Fig. 11.

1, Pelvic fascia clothing the upper surface of the levator ani; 2, middle hæmorrhoidal artery; 3, superior hæmorrhoidal artery (right division); 4, the bladder; 5, the ureter; 6, vas deferens; 7, seminal vesicle; 8, pelvic fascia (recto-vesical layer); 9, the pelvic peritoneum; 10, the rectum; 11, the sacral canal; 12, cut surface of the ano-coccygeal raphe.

The anterior relations of the rectum were thus exposed. The bladder was moderately distended with air beforehand.

The ureters (5) are seen as they lie in relation to the bladder close to their terminations, and just here they are overlapped by the posterior rounded extremities of the seminal vesicles (7). These latter, possessing an irregularly sacculated contour, approximate each other as they extend forward towards the base of the prostate, lying between the extraperitoneal portion of the base of the bladder and the pelvic fascia (recto-vesical layer) (8). The vas deferens (6) is seen on each side running along the inner margin of the corresponding seminal vesicle and gradually approaching the middle line in front. Near its termination each vas is seen to assume a dilated appearance. Between the vasa deferentia is seen the extra-peritoneal portion of the base of the bladder which is in relation to the rectum and which corresponds to the triangular area in the interior of the bladder called the trigone, the base of which is formed by a line connecting the orifices of the two ureters and its apex at the inner opening of the urethra. The middle hæmorrhoidal arteries (2) are seen piercing the pelvic fascia on each side so as to reach the rectum. In the course of the dissection some of their branches were observed to anastomose with others of the superior hæmorrhoidal as they lay in contact with the muscular coat of the rectum.

The recto-vesical layer of the pelvic fascia (8) has in part been preserved. It is seen to form a well-defined layer between the seminal vesicles and bladder in front and the rectum behind. When traced in a downward direction this fascia is found to be continuous with the posterior part of the prostatic sheath. Between it and the rectum there intervenes some loose areolar tissue, and separation of the bowel is readily effected here. This fascia also, as it extends across in front of the rectum, binds the vesiculæ seminales

and vasa deferentia to the base of the bladder, as can be well seen in this illustration.

This dissection, shown in Figure 12 has been prepared to illustrate the applied anatomy of perineal excision of the rectum. The subject was placed in the lithotomy position with the buttocks well raised. A median incision was made,

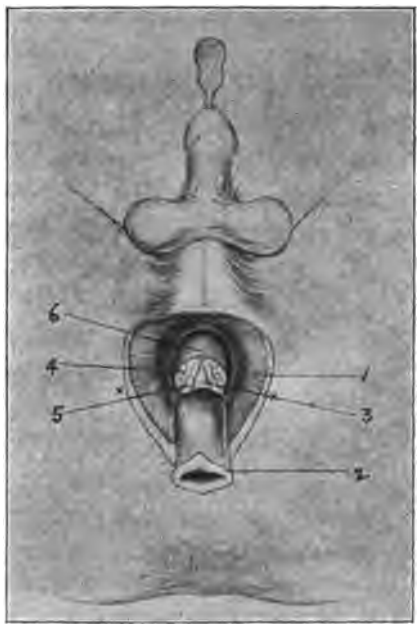


Fig. 12.

1, Levator ani; 2, rectum with the anal integument; 3, bladder; 4, seminal vesicle; 5, vas deferens; 6, prostate.

starting behind the anus and extending backwards over the coccyx. It was gradually deepened through the ano-coccygeal raphe (Figs. 6 and 7) until the posterior aspect of the rectum was exposed. With the finger introduced into the wound it was quite easy to define its lateral aspects as well. By means of stout scissors the anus was encircled by an incision, which, commencing behind, separated the levatores

ani all around from the bowel (2). The edges of the wound at the points x, x′ were well retracted, and the further separation of the rectum proceeded with in front, a sound meanwhile being introduced into the bladder. Finally, the rectum was drawn backwards into the coccygeal angle of the wound, the levatores ani having been everted as fully as possible. The anal integument, together with the external sphincter, remain connected with the rectum. This dissection shows very well the anterior relations of the latter,—viz., the bladder, 3; seminal vesicles, 4; vasa deferentia, 5; and prostate, 6.

The recto-vesical fascia (Fig. 11, 8) had to be removed so as to display the seminal vesicles and vasa deferentia.[a]

The PRESIDENT was glad to see that Dr. Taylor had emphasised the distinction between two parts of the rectum—the sphincteric and the supra-sphincteric areas; he (the President) would go further, for he held that they were functionally and anatomically distinct—the former was capable of acting as a reservoir, while the latter, which he had called the anal canal, was not. While he agreed with Dr. Taylor as regards the sphincteric action of the levatores ani, he thought it would be very difficult clinically to distinguish between the action of the external sphincter and the levator, which practically ran into one another, as seen on coronal section through the anal canal. He was not quite satisfied that the internal sphincter was purely an involuntary muscle, Undoubtedly, the gluteus maximus and ischio-rectal pads of fat assisted in the closure of the anus. He approved Dr. Taylor's proposal of preserving and utilising the levatores ani in excisions of the rectum, in order to secure its assistance as a sphincter.

DR. BIRMINGHAM expressed the opinion that the internal sphincter was not a real functional sphincter of the anus at all. The anal canal is merely an antero-posterior slit, with its lateral

[a] The various drawings were executed for me by Mr. R. Mannix, 10 North Frederick-street, Dublin; and in making the dissections I received most valuable assistance from Mr. E. Blake Knox, to whom my best thanks are due.

walls in contact; a contraction of the internal sphincter which surrounds this passage, and has no fixed attachment, would tend rather to relax than to close the canal. Its use was to force the fæces through the canal during defæcation. The levatores ani, he believed, were the chief sphincter, and they were placed in the most advantageous position for their action to be effective—namely, at the very beginning of the anal passage; a sphincter lower down would be less effective. The explanation of the very slight change of the reflexion of peritoneum from rectum to bladder, brought about by distension of the bladder, was to be found in the fact that the base of the bladder was practically unaffected by distension.

Dr. Purser said that, judging by the analogy of the bladder, in which the so-called sphincter muscle at the neck was certainly not the true sphincter, but was used for expelling the last drops, while the true sphincter was of striped muscle lower down, he was inclined to agree with Dr. Birmingham's view of the nature of the internal sphincter. It had been shown that, even after removal of the spinal cord, the external sphincter preserved its tone and underwent rhythmic contraction, which would seem to show that it had a regulating nervous mechanism within itself.

DEMONSTRATION OF SOME EARLY HUMAN OVA.

By A. FRANCIS DIXON, M.B.;
Chief Demonstrator of Anatomy, Trinity College, Dublin.

[Read in the Section of Anatomy and Physiology, February 5, 1897.]

I HAVE to thank the members of the Staff of the Rotunda Hospital for their kindness in collecting for me the specimens, the photographs of which are exhibited on the accompanying plate.

The photographs have either been taken natural size with an ordinary camera, or they have been magnified by means of Steinheil lenses, such as are provided with Leitz's dissecting microscopes, fitted to an ordinary camera. In all cases the photographs were made while the specimens were immersed in alcohol.

The first photograph (Fig. 1) is of a human ovum, which I have estimated to be about fifteen days old. It is shown natural size, and the chorionic sac is unopened. The sac is covered almost all over by shortly-branched villi of practically equal size. This ovum is rather more flattened than is usually the case with human ova of the age to which it belongs, and measures, including the villi, 8 mm. in its longest, and 3·5 mm. in its shortest diameter. The fact that villi are still absent, even over a small area, at one pole leads me to consider this embryo not yet sixteen days old. This conclusion agrees with that derived from the history of the case from which it was obtained, which gives the most probable age of the ovum as fifteen days. Up to the present time I have not had an opportunity of making serial sections of this ovum, as Dr. J. K. Murphy, to whom it belongs, is desirous of making further observa-

1

2

3

4

5

7

6

8

tions on it before it is sectioned. Figures 2 and 3 are magnified views of the same ovum, and No. 3 shows the pole where villi are absent over a small area of the chorionic sac.

The next embryo which I have to show is illustrated in Figures 4, 5, and 6. Fig. 4 is a photograph taken natural size, and shows the chorionic sac opened, and the little embryo, which I believe to be about twenty-three days old, is seen lying attached to the inner wall of the sac. The next two photographs are enlarged views of the same embryo. The relatively large yolk sac is a conspicuous object in each of the photographs, and is attached to the ventral aspect of the body by a narrow stalk. In both these last two figures a good view is obtained of the delicate amniotic membrane surrounding the embryo as a loose bag; the membrane is, however, so thin and transparent that the different parts of the embryo can be clearly seen and recognised through it. At the anterior or head end of the embryo one can easily make out the branchial arches, and the clefts between them. Immediately below them we have the bulging due to the heart, and then the stalk of the yolk sac crossing over the body hides the posterior end and tail of the embryo. The allantoic stalk which connects the embryo to the chorion lies just under the stalk of the yolk sac. In Fig. 6 the developing arm is seen as a simple flap-like structure projecting from the side of the embryo. The leg, which is not so far advanced as the arm, is covered by the yolk sac. The history of the case from which the ovum was obtained, and a consideration of the stage of development reached, point to this embryo being about twenty-three days old.

Figure 7 illustrates another specimen of human embryo as nearly as possible of the same age as the last, but not in so good a state of preservation. Here the amnion and

the yolk sac have been carefully removed. The developing leg is well seen, as is also the stout projecting tail. This blunt, thick tail is a very characteristic object in embryos at this age; later on it becomes much more slender in proportion to the size of the rest of the embryo. The place where the yolk sac has been removed can be made out as the circular outline of the stalk cut across is seen just below the heart. The allantoic stalk, by which the embryo is attached to the inner wall of the chorionic sac, is seen below the stalk of the yolk sac and above the leg and tail.

The remaining two photographs illustrate an embryo of about thirty-four days. In the head, which is sharply flexed on the body, we now recognise a well-marked eye, with a groove leading from it down towards the primitive mouth. The different parts of the brain are clearly seen shining through the superficial coverings of the head, and the manner in which they are bent on each other may be made out. The position of the neck-bend or flexure, where the medulla joins the spinal cord, of the pontine bend, and of the flexure of the mid-brain, can be determined with ease. The young cerebral hemisphere can be seen bulging outwards in the region above and in front of the eye. Below the hemisphere we have the nose, and then the maxillary bar, followed by the mandibular and hyoid arches. The rest of the arches and clefts are now hidden in a deep recess called the cervical sinus. The heart is very large, and its subdivisions can be recognised as it bulges forwards below the head and above the attachment of the allantoic stalk and the slender stalk of the yolk-sac. At this stage the arm is clearly subdivided into arm, forearm, and hand, but the fingers are not yet marked off from each other by radially arranged depressions, as they would be in a very slightly older stage. The

hand is represented by the somewhat disc-like terminal expansion of the upper extremity. The leg, like the arm, is already subdivided, but it is not so far on in its development. This is especially well seen in the foot segment. The leg still retains its primitive disposition, inasmuch as it is not yet rotated into the position occupied in the adult. In the trunk of the embryo the mesoblastic somites are well marked. The blood-vessels outside the embryo being distended with blood, are seen in the different photographs very distinctly; the vitelline vessels are seen in each of the photographs, both on the stalk of the yolk-sac and ramifying over the yolk sac itself. In Figure 9, which shows the ventral aspect of the embryo, the allantoic vessels are seen passing along the allantoic sac towards the chorion.

The President asked Dr. Dixon what preservative he used for the embryos. He himself had found corrosive sublimate the most satisfactory.

Dr. Birmingham inquired as to the method in which the photographs were taken.

Dr. Dixon, in reply, said he had always used methylated spirits for preserving his human embryos. Nitric acid was best for preserving fowl embryos. In photographing, the specimens were placed in glass cells with dark bottoms, the cells were completely filled with spirits, and the cover slid on, so as to exclude all air bubbles. Special care had to be taken with the lighting.

INDEX.

[*The names of Contributors are printed in* SMALL CAPITALS.]

Abortion, incomplete, H. JELLETT on, 352.

Acute intestinal obstruction, J. S. M'ARDLE on, 206.

Address upon development of the brain. Professor HIS, 1.

Anastomosis, intestinal, by means of decalcified bone ring, C. B. BALL on, 291.

Anatomy, surgical applied, of rectum, E. H. TAYLOR on, 451—discussion 472.

Angina pectoris, J. KNOTT on, 144.

Aorta and heart, pathological conditions of, J. B. COLEMAN on, 394.

Apparatus for air distension of bladder, J. LENTAIGNE on, 306.

Ataxy, locomotor, J. B. COLEMAN and A. C. O'SULLIVAN on, 400—discussion, 402.

ATTHILL, LOMBE, on anticipation of *post-partum* hæmorrhage, and action of ergot on pregnant women, 338.

BALL, CHARLES B., on intestinal anastomosis by means of a new pattern of decalcified bone ring, 291.

BARRY, P. J., on pyometra with pregnancy in the second horn of a uterus bicornis, 332.

BEATTY, WALLACE, on pityriasis rubra, 33—enteric fever, jaundice and hæmaturia, 54.

BENNETT, E. H., on fracture of metacarpal bone of the thumb, 309—dislocation of sternal end of clavicle backwards, 380.

Bone, metacarpal, of the thumb, fracture, E. H. BENNETT on, 309.

BOYD, ALFRED E., on report of vaccination committee, 410.

BOYD, M. A., on the significance of dilatation or gastrectasia in functional and organic diseases of the stomach, 76—acute septico-pyæmia, 386.

Brain, development, Professor HIS on, 1.

BURGESS, J. J., on diabetes insipidus, 67.

Cameron, Sir Charles A., on failure of hospital accommodation in Dublin, 437.

Children's diseases, W. L. Symes on, 97—discussion, 143.

Clavicle, dislocation of sternal end backwards, E. H. Bennett on, 380.

Coffey, Denis J., on organic sulphates of urine, 446.

Coleman, J. B., on pathological conditions of heart and aorta, 394.

Coleman, J. B., and O'Sullivan, A. C., on locomotor ataxy, 400.

Concurrent scarlatina and enteric fever, 43.

Cosgrave, E. MacDowel, on concurrent scarlatina and enteric fever, 43—discussion, 63—relapse in scarlatina, 92.

Cystotomy, supra-pubic, apparatus for air distension of bladder, J. Lentaigne on, 306.

Desquamation in enteric fever, Ninian Falkiner on, 59.

Diabetes insipidus, J. J. Burgess on, 67—discussion, 72.

Dickson, E. Winifred, on a case of rigid os; discission by Dührssen's method, 312—double ovariotomy with eighteen months' interval between the operations, 375.

Dilatation of stomach, M. A. Boyd on, 76—discussion, 90.

Dislocation of sternal end of clavicle backwards, E. H. Bennett on, 380—discussion, 385.

Dixon, A. Francis, on early human ova, 474.

Drury, H. C., on guaiacol in pyrexia, 20.

Dührssen's method for discission of rigid os, E. Winifred Dickson on, 312—discussion, 314.

Ectopic gestation, F. W. Kidd on, 316.

Enteric fever and scarlatina, concurrent, E. MacD. Cosgrave on, 43.

Enteric fever, desquamation in, Ninian Falkiner on, 59—discussion, 63.

Enteric fever, jaundice, and hæmaturia, Wallace Beatty on, 54.

Enteritis, pseudo-membranous, W. Frazer on, 391.

Ergot, action on pregnant women, Lombe Atthill on, 338—discussion, 347.

Ergot, use of, in obstetrics, T. More Madden on, 359—discussion, 370.

Falkiner, Ninian, on desquamation in enteric fever, 59.

Fibro-myoma, intraligamentous, strangulated by protrusion through inguinal canal, A. J. Smith on, 367.

Fracture of metacarpal bone of thumb, E. H. Bennett on, 309—discussion, 311.

Frazer, W., on pseudo-membranous enteritis, 391.

Gestation, ectopic, F. W. Kidd on, 316—discussion, 336.

Glenn, J. H., on hæmorrhage into broad ligament from stump of ovarian cyst, complicating the puerperium, 372.

Guaiacol in pyrexia, H. C. Drury on, 20—discussion, 30.

Hæmaturia in enteric, Wallace Beatty on, 54.

Hæmorrhage into broad ligament from stump of ovarian cyst, complicating the puerperium, J. H. Glenn on, 372.

Hæmorrhage, *post-partum*, anticipation of, Lombe Atthill on, 338—discussion, 347.

Haughton, W. S., on application of the "X-rays" in diagnosis, 404.

Heart and aorta, pathological conditions of, J. B. Coleman on, 394—discussion, 398.

Hernia, strangulated, with gangrenous intestine, F. T. Heuston on, 286—discussion, 299.

Heuston, Francis T., on strangulated femoral hernia with gangrenous intestine, 286.

His, Prof., on development of brain, 1.

Hospital, failure of, accommodation in Dublin, Sir C. A. Cameron on, 437—discussion, 443.

Intestinal anastomosis by means of a new pattern of decalcified bone ring, C. B. Ball on, 291—discussion, 299.

Intestinal obstruction, acute, J. S. M'Ardle on, 206.

Jaundice in enteric, Wallace Beatty on, 54.

Jellett, Henry, on incomplete abortion, 352.

Kidd, F. W., on three cases of ectopic gestation, 316.

Knott, J., on angina pectoris, 144.

Lentaigne, John, on pyloroplasty for non-malignant stricture of pylorus, recovery, 302—apparatus for air distension of bladder in supra-pubic cystotomy, 306.

Locomotor ataxy, J. B. Coleman and A. C. O'Sullivan on, 400.

M'Ardle, J. S., on acute intestinal obstruction, 206.

McWeeney, E. J., on Widal's method of typhoid diagnosis, 62.

Madden, T. More, on use of ergot in obstetrics, 359.

Meldon, Austin, on successful cases of tapping pericardium, 194.

Metacarpal bone of thumb, fracture of, E. H. Bennett on, 309.

Micro-organisms, dissemination and method of destroying, in sewer gas, C. R. C. Tichborne on, 427—discussion, 434.

Myles, T., on some cases of nephrectomy and nephrolithotomy, 259.

Nephrectomy and nephrolithotomy, T. Myles on, 259—discussion, 283.

Obstruction, acute intestinal, J. S. M'Ardle on, 206—discussion, 229.
Os, rigid, discission by Dührssen's method, E. Winifred Dickson on, 312.
O'Sullivan, A. C., and Coleman, J. B., on locomotor ataxy, 400.
Ova, early human, A. F. Dixon on, 474.
Ovarian cyst, hæmorrhage from stump of, into broad ligament, J. H. Glenn on, 372.
Ovariotomy, double, with eighteen months' interval, E. Winifred Dickson on, 375—discussion, 378.

Pericardium, tapping of, A. Meldon on, 194—discussion, 200.
Pityriasis rubra, Wallace Beatty on, 33—discussion, 40.
Pregnancy, ruptured tubal—abdominal section, A. J. Smith on, 329—discussion, 333.
Pyæmia, acute septico-, M. A. Boyd on, 386—discussion, 389.
Pyloroplasty, J. Lentaigne on, 302—discussion, 307.
Pyometra with pregnancy in uterus bicornis, P. J. Barry on, 332.
Pyrexia, guaiacol in, H. C. Drury on, 20.

Rectum, surgical applied anatomy of, E. H. Taylor on, 451.
Relapse in scarlatina, E. MacD. Cosgrave on, 92.

Scarlatina and enteric fever, concurrent, E. MacD. Cosgrave on, 43.
Scarlatina, relapse, E. MacD. Cosgrave on, 92—discussion, 95.
Sewer gas, method of destroying germ emanations from, C. R. C. Tichborne on, 427.
Smith, Alfred J., on ruptured tubal pregnancy treated by abdominal section, 329—intraligamentous fibro-myoma strangulated by protrusion through inguinal canal, 357.
Stomach, dilatation of, M. A. Boyd on 76.
Sulphates, organic, of urine, D. J. Coffey on, 446.
Surprises and mistakes, Sir W. Thomson on, 183.
Symes, W. Langford, on clinical pictures of children's diseases, 97.
Symphyseotomy, S. M. Thompson on, 351.

Taylor, Edward H., on surgical applied anatomy of rectum, 451.
Thompson, S. M., on symphyseotomy, 351.
Thomson, Sir W., on some surprises and mistakes, 183.
Tichborne, Charles R. C., on dissemination of micro-organisms and best method of destroying germ emanations from sewer gas, 427.
Tongue, excision of, partial and complete, W. I. Wheeler on, 233—discussion, 249.
Typhoid diagnosis, Widal's method, E. J. McWeeney on, 62.

Urine, organic sulphates of, D. J. COFFEY on, 446.
Uterus bicornis, pyometra with pregnancy in, P. J. BARRY on, 332.

Vaccination committee report, 1896, 410.

WHEELER, W. I., on sixty-one cases of partial and complete excision of the tongue, 233.
Widal's method of typhoid diagnosis, E. J. MCWEENEY on, 62.

"X-rays," application of, in diagnosis, W. S. HAUGHTON on, 404.

Printed by JOHN FALCONER, 53 Upper Sackville-street, Dublin.